MR3 Medical Rehabilitation Research Resource

NETWORK

Catalyzing Transdisciplinary Research to Develop Innovative Rehabilitation Approaches with Lasting Impacts

The 4th Annual MR3 Network Scientific Retreat

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Agenda

Day 1: Thursday, September 19, 2024 (All times Eastern)

10:30 to 10:40 a.m.	**Welcome** **Rick Segal, PT, Ph.D., FAPTA** Professor, Department of Health Sciences and Research Medical University of South Carolina Education Director, National Center of Neuromodulation for Rehabilitation; Lead, MR3 Coordinating Center
10:40 to 11:30 a.m. 30-min presentation 20-min discussion	**Keynote Presentation** **Diana W. Bianchi, M.D.** Director, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health *Changing Paradigms of Care: Lessons Learned from the Prenatal Space* **Introduction:** Ralph Nitkin, Ph.D. **Session Moderator:** Rick Segal, PT, Ph.D., FAPTA
11:30 to 11:40 a.m.	**Break**
11:40 a.m. to 1:00 p.m. 20 min each, including discussion	**Session 1: Clinician Research and Community Engagement–Capacity Building** **Bridget Fowler King, PT, DPT, MS** Shirley Ryan AbilityLab *Fueling Innovation: Catalyst Grants Spark Interdisciplinary Rehabilitation Research* **Melissa Briody, MOT, OTR/L, MS** Shirley Ryan AbilityLab *It's All About Communication! Teaching Researchers to Talk to Clinical Collaborators* **Susan Magasi, Ph.D.** University of Illinois, Chicago *Intentional Inclusion of Navigator Scientists to Enhance the Relevance and Sustainability of Peer Support Interventions* **Henry Hrdlicka, Ph.D.** Gaylord Specialty Healthcare *Development of a Central Research Infrastructure that Supports Interdisciplinary Clinical Research and the Adoption of Evidence-Based Practices in the Healthcare Settings* **Session Moderator:** Miriam Rafferty, Ph.D., DPT, PT

1:00 to 1:10 p.m.	**Break**
1:10 to 2:10 p.m. 20 min each, including discussion	**Session 2: Augmented Therapy–Rehabilitation Technology** **Abed Khorasani, Ph.D.** Northwestern University *Insights from Implementing Wearable Technologies for Stroke Rehabilitation Outside Research Laboratories* **Matthew Picard-Fraser, PT, DPT** MGH institute of Health Professions *Vagus Nerve Stimulation Paired with Physical Therapy to Promote Mobility Rehabilitation in Chronic Ischemic Stroke* **Prabhat Pathak, Ph.D.** Harvard University *Soft Wearable Robot that Provides Anti-Gravity Arm Support Improves Upper Limb Movement Quality in Individuals Post-Stroke* **Session Moderator:** Amrita Sahu, Ph.D.
2:10 to 2:20 p.m.	**Break**
2:20 to 3:20 p.m. 20 min each, including discussion	**Session 3: Clinician Research and Community Engagement–Caregiver Engagement and Education** **Alexandra Terrill, Ph.D.** University of Utah *"Rehabbing the Couple:" Supporting Couples Coping with Stroke through a Novel Dyadic Intervention* **Christine Lathren, M.D., MSPH** University of North Carolina at Chapel Hill *Self-Compassion-Based Resilience Habits Course for Caregivers of Children with Physical Disabilities* **Ashley Collimore, Ph.D.** Boston University *Trial Ready: Informing a Mobility Intervention Trial for Infants with Down Syndrome* **Session Moderator:** Jessica Edelstein, Ph.D., OTR
3:20 to 3:30 p.m.	**Break**

3:30 to 4:30 p.m. 20 min each, including discussion	**Session 4: Clinician Research and Community Engagement– Patient Engagement and Education** **Katherine Dimitropoulou, Ph.D., OTR/L, MA, MSPOR** Columbia University *Game On! CP Soccer Intensive Camp to Promote Self-Efficacy, Positive Attitudes Towards Physical Activity, and Fitness among Children and Adolescents with Cerebral Palsy* **David Morgenroth, M.D.** University of Washington *A Novel 'Test-Drive' Strategy for Prosthetic Foot Prescription Using a Robotic Prosthetic Foot Emulator* **Amy Herrold, Ph.D.** Edward Hines, Jr., VA Hospital *A Transdisciplinary Collaborative Study of mTBI and Chronic Pain Using iTBS and Yoga* **Session Moderator:** Allen Heinemann, Ph.D.
4:30 to 5:30 p.m. 20 min each, including discussion	**Session 5: Clinician and Research Community Engagement– Education** **Mara Yale, Ph.D.** Massachusetts General Hospital *Emphasis on Parent Education and Engagement in Research to Increase Physical Activity Engagement for Ambulatory Children and Adolescents with Cerebral Palsy* **Andrew Hansen, Ph.D.** Minneapolis VA Health Care System, University of Minnesota *Rehabilitation & Engineering Center for Optimizing Veteran Engagement & Reintegration (RECOVER): Transdisciplinary Collaborations to Drive Change in Participation in Veterans* **Cory Christiansen, PT, Ph.D.** VA Eastern Colorado Healthcare System *Walking Exercise Sustainability through Telehealth for Veterans with Lower-Limb Amputation* **Session Moderator:** Corey Morrow, Ph.D., OTR/L

5:30 to 6:00p.m.	**Funding Agency Q&A** **NIH National Center for Medical Rehabilitation Research (NCMRR)** Joe Bonner, Ph.D., *Health Scientist* Ralph Nitkin, Ph.D., *Deputy Director* **Administrator and Program Officer Veterans Affairs Rehabilitation Research & Development (VA RR&D)** Brian Schulz, Ph.D., *Scientific Program Manager for Rehabilitation Engineering and Prosthetics/Orthotics* Timothy Brindle, Ph.D., *Scientific Program Manager for Musculoskeletal Health & Function* **National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR)** Radha Holavanahalli, Ph.D., *Rehabilitation Program Specialist* **Congressionally Directed Medical Research Programs, United States Department of Defense** Patricia Henry, Ph.D., *Program Manager* Daniel Monson, Ph.D., *Program Manager* **Session Moderator:** Rick Segal, PT, Ph.D., FAPTA

Day 2: Friday, September 20, 2024 (All times Eastern)

10:30 to 10:40 a.m.	**Welcome** **Rick Segal PT, Ph.D., FAPTA** Medical University of South Carolina
10:40 to 11:30 a.m. 30-min presentation 20-min discussion	**Keynote Presentation** **Michael L. Boninger, M.D.** Distinguished Professor and Dean for Sustainability School of Medicine, University of Pittsburgh Chief Medical Sustainability Officer University of Pittsburgh Medical Center *Building Innovative, Lasting, Interprofessional Teams: What I Have Learned from Others* **Session Moderator:** Rick Segal, PT, Ph.D., FAPTA
11:30 to 12:30 p.m. 20 min each, including discussion	**Session 6: Augmented Therapy–Rehabilitation Technology** **Neha "Tej" Mehta, PT, Ph.D.** New York University *Cross-Disciplinary Study of the Neural Basis of Rehabilitation Outcomes with Virtual Reality: A Preliminary Investigation* **Sharon Stansfield, Ph.D., MSE** Ithaca College *The WeeBot: Development of a Unique Powered Mobility Device for Very Young Infants through Transdisciplinary Collaboration* **Kim Ingraham, Ph.D.** University of Washington *Learning to Explore and Exploring to Learn: Understanding Powered Mobility Use in Toddlers with Disabilities* **Session Moderator:** Warren Lo, M.D.
12:30 to 12:40 p.m.	**Break**

12:40 to 1:40 pm 20 min each, including discussion	**Session 7: Transdisciplinary Rehabilitation** **Colleen Johnson, PT, DPT** Shirley Ryan AbilityLab *Advancing Hospital Acquired Pressure Injury Prevention with a Data-Driven Transdisciplinary Model* **Akhil Mohan, Ph.D.** Cleveland Clinic *A Novel Cluster Analysis Scheme for Determining Levels of Upper Extremity Functional Capacity in People with Chronic Stroke* **Brooke Slavens, Ph.D., MS** University of Wisconsin-Milwaukee *Transdisciplinary Approaches for Preserving Shoulder Health in Children and Adults with Spinal Cord Injury/Dysfunction* **Session Moderator:** Rick Segal, PT, Ph.D., FAPTA
1:40 to 1:50 p.m.	**Break**
1:50 to 3:10 p.m. 20 min each, including discussion	**Session 8: Augmented Therapy–Telehealth and Wearables** **Sam Nemanich, Ph.D., MSCI** Marquette University *Motor Skill Learning in School-Age Children Tested with a Gamified Mobile Health System* **Kevin McLaughlin, DPT** Johns Hopkins University *Implementation of Remote Therapeutic Monitoring into Physical Therapy at a Large Academic Healthcare System* **Christopher DiCesare, Ph.D.** Exponent, Inc. *Building Context-Aware Digital Health Tools: A Framework for Evaluating Real-World Human Health and Behavior* **Brad Willingham, Ph.D.** Shepherd Center *Enhancing Accessibility and Precision in Multiple Sclerosis Rehabilitation: A Transdisciplinary Approach to Digital Health Solutions* **Session Moderator:** Matthew Petrucci, Ph.D.

3:10 to 3:50 p.m. 20 min each, including discussion	**Session 9: Provider Experience** **Amy Kemp, Ph.D., CCC-SLP** Washington State University *Predicting Device Implementation Potential: Development and Validation of a Tool Based on the DART Framework* **Mary Jackson, OTD, OTR/L** University of North Carolina at Chapel Hill *Provider Experiences with Integrative Medical Group Visits for Chronic Pain* **Session Moderator(s):** Lisa Juckett, Ph.D., OTR/L, CHT
3:50 to 4:05 pm	**Closing Remarks** **Theresa Hayes Cruz, Ph.D.** Director, NICHD National Center for Medical Rehabilitation Research

Acknowledgements

The National Institutes of Health Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), which is home to the National Center for Medical Rehabilitation Research (NCMRR), in collaboration with the National Center for Complementary and Integrative Health (NCCIH), the National Institute of Biomedical Imaging and Bioengineering (NIBIB), the National Institute on Deafness and Other Communication Disorders (NIDCD), and the National Institute of Neurological Disorders and Stroke (NINDS), and the National Institute of Nursing Research (NINR), supports the Medical Rehabilitation Research Resource Network (MR3N). The MR3N is made up of six P2C resource center grants that provide infrastructure and access to expertise, technologies, and resources to foster clinical and translational research in medical rehabilitation.

Day 1 Speakers

Keynote: Diana W. Bianchi, M.D.

Diana W. Bianchi oversees the institute's research on pediatric health and development, maternal and reproductive health, intellectual and developmental disabilities, and rehabilitation medicine, among other areas. These efforts include managing a staff of approximately 1,400 people and an annual budget of approximately $1.75 billion. Dr. Bianchi has had a busy tenure since joining NICHD in 2016. She spearheaded efforts on the NICHD Strategic Plan, released in September 2019, which outlined goals and aspirations to guide institute research. It is currently undergoing a refresh for the years 2025 through 2030. She also oversaw the crafting and vetting of the institute's new vision statement—Healthy Pregnancies. Healthy Children. Healthy and Optimal Lives—as well as its new mission statement. The latter, generated alongside the strategic plan, underscores NICHD's directive since its founding—to lead research and training to understand human development—and incorporates goals for all facets of NICHD—to improve reproductive health, enhance the lives of children and adolescents, and optimize abilities for all.

Bridget Fowler King, PT, DPT, MS

Bridget Fowler King is a Physical Therapist and Research Project Manager for the Research Accelerator Program and C-STAR Collaborative Mentorship Program at Shirley Ryan AbilityLab. She holds a recent master's degree in Health Services and Outcomes Research from Northwestern University. With over a decade of experience in neurologic physical therapy, Fowler King has excelled in clinical practice, clinical mentorship, and supporting clinical research, particularly emphasizing the translation of research into clinical application. Her research interests focus on implementation science and qualitative methods, aiming to enhance access to quality care and accelerate the integration of evidence-based practices into clinical settings.

Melissa Briody, MOT, OTR/L, MS

Melissa Briody is a Senior Project Manager at Shirley Ryan AbilityLab in Chicago, IL. She oversees the Center for Smart Use of Technologies to Assess Real World Outcomes (C-STAR), an NIH-funded infrastructure center that supports early-career rehabilitation researchers using innovative technology to measure outcomes in the lab, clinic, and community. She also oversees internal research initiatives designed to increase communication and collaboration between researchers and clinicians.

Melissa completed her Master's Degree in Occupational Therapy from Xavier University in 2012. She graduated with a Master of Science in Health Systems Management from Rochester Institute of Technology in 2020. Melissa practiced occupational therapy in diverse healthcare settings in Chicago, IL and Rochester, NY before transitioning into management. Her clinical expertise lies within pediatric rehabilitation for developmental, neurological, and physical disabilities.

Susan Magasi, Ph.D.

Susan Magasi is Professor and Head of the Department of Occupational Therapy at the University of Illinois Chicago. She is passionate about advancing health and participation equity for people with disabilities. She works closely with the disability community using an equity-focused, community-based participatory approach to help understand and break down barriers to primary and cancer care for people with disabilities via peer support and self-management-based interventions. Her interdisciplinary team is also adapting these interventions for remote delivery via smartphone-based apps.

Henry Hrdlicka, Ph.D.

Henry C. Hrdlicka, PhD, is the Director of Research at Gaylord Specialty Healthcare's Milne Institute for Healthcare Innovation. He works with the interdisciplinary clinical teams across Gaylord's healthcare system, other academic and healthcare leaders, and the Milne Institute's research staff to conduct rehabilitation research, develop evidence-based practices, and evaluate new applied technologies during clinical practice. He aims to design seamless study protocols, which are minimally disruptive to patients and clinicians, to promote research participation while maximizing patients' outcomes and quality of life. Before Gaylord Specialty Healthcare, Dr. Hrdlicka completed his Ph.D. research at the University of Connecticut at UCONN Health in Farmington, Connecticut. Dr. Hrdlicka's bibliography is available at ORCiD 0000-0002-7014-7919.

Abed Khorasani, Ph.D.

Dr. Khorasani is a postdoctoral scholar at Northwestern University with over ten years of experience in developing neural interfaces for neurological disorders such as stroke and spinal cord injury. His expertise includes software and hardware design, signal processing, machine learning, and computational neuroscience.

Currently at Northwestern, Dr. Khorasani is leading two NIH-funded clinical trials focused on stroke rehabilitation. His research involves using at-home wearable myoelectric computer interfaces to improve movement for both chronic and acute stroke survivors. He is also contributing in a clinical trial on combining myoelectric computer interface with memory reactivation (TMR) during deep sleep to improve motor recovery after stroke.

Prior to joining Northwestern, Dr. Khorasani was a research engineer at the University of Washington where he contributed to the design of a brain-to-spinal interface for restoring movement in animal models with spinal cord injury.

Matthew Picard-Fraser, PT, DPT

Matthew is a physical therapist and Ph.D. student in Rehabilitation Sciences Program at the MGH Institute of Health Professions. He is a Doctoral Research Fellow in the Brain Recovery Lab, led by Dr. Teresa Kimberley, where his work focuses on development of neuromodulatory interventions for neurological disorders. Specific to this presentation, Matt has worked with Paired Vagus Nerve Stimulation since the pivotal trial and is interested in further adapting and improving the intervention to improve patient outcomes. Prior to beginning his Ph.D., Matt received his Doctorate of Physical Therapy from the MGH Institute of Health Professions and worked as an inpatient physical therapist at Spaulding Rehabilitation Hospital–Cape Cod.

Prabhat Pathak, Ph.D.

Dr. Prabhat Pathak is a Postdoctoral Fellow in Bioengineering at Harvard University in the John A. Paulson School of Engineering and Applied Sciences. His research interests are: 1. Developing a soft wearable robot to improve the arm function of individuals with upper-extremity motor impairment during activities of daily living. 2. Developing biomechanical evaluation methods to understand the effect of stroke on upper limb movement during functional tasks. 3. Developing methods that use wearable motion sensors to track post-stroke upper limb movement impairment.

Alexandra Terrill, Ph.D.

Dr. Alex Terrill is an Associate Professor in the Departments of Occupational & Recreational Therapies and Physical Medicine & Rehabilitation, and Director of Stroke Rehabilitation Quality of Life Research at the Craig H. Neilsen Rehabilitation Hospital at the University of Utah. As a licensed clinical psychologist specializing in rehabilitation, her research focuses on mental health in neurorehabilitation patient populations and developing interventions to support patients and their care partners. Her research in this area has been continuously funded by the National Institutes of Health/National Center for Medical Rehabilitation Research.

Christine Lathren, M.D., MSPH

Christine Lathren, M.D., MSPH, is a research assistant professor within the Program on Integrative Medicine, Department of Physical Medicine and Rehabilitation, at the University of North Carolina at Chapel Hill. Her research explores how self-compassion may strengthen relationship health and improve well-being outcomes, particularly in family caregiving and parent-child contexts where there is high stress. Using both quantitative and qualitative methods, she is interested in adapting self-compassion interventions and their implementation to be maximally feasible, acceptable and beneficial for diverse families and contexts. To this end, she often uses stakeholder-engaged techniques and co-design principles to partner with caregivers and families in the creation of tailored programs and materials.

Ashley Collimore, Ph.D.

Dr. Ashley Collimore is a postdoctoral researcher at Boston University in the Physical Therapy Department. Previously, she received her Ph.D. in Rehabilitation Sciences from Boston University and a BSE in Mechanical Engineering and Applied Mechanics from the University of Pennsylvania. Her goals are to create and evaluate assistive and rehabilitative technologies that target walking for children with mobility impairments. Her current research is investigating motor development trajectories for infants with Down syndrome and the efficacy of a body-weight support harness that enables independent mobility and exploration for this population.

Katherine Dimitropoulou, Ph.D., OTR/L, MA, MSPOR

Dr. Dimitropoulou is an Assistant Professor in the Department of Rehabilitation & Regenerative Medicine, Occupational Therapy Programs and the Director of the Doctor of Education in Movement Sciences (Occupational Therapy) program at Columbia University. She has received her BA in Occupational Therapy at the University of Athens (Greece), her postprofessional MA in Developmental Disabilities at New York University (NYU), her Ph.D. in Advanced Experimental Methods in Occupational Therapy (Child Development) at NYU, and her MS in Biostatistics (Patient-Oriented Research) at the Mailman School of Public Health at Columbia University. Dr. Dimitropoulou is the director of the Action Development and Function Lab at Columbia University, and her research focuses on measuring and improving functional abilities in children and adolescents with physical limitations (i.e. Cerebral Palsy). Specifically, her research focuses on physical activity (PA) engagement and the positive impact of PA on physical and behavioral health for these populations. She has developed the Game On Sports framework to provide an evidence-based manualized process/protocol for developing and sustaining PA programs that are geared to the needs of children and adolescents with Cerebral Palsy. She has received funding and has conducted several feasibility and pilot studies following a community-based participatory method to establish protocols for PA camps/programs, training of coaches and parents as well as individual metrics to quantify physical and behavioral benefits for children and adolescents with CP.

David Morgenroth, M.D.

David Morgenroth, M.D., is a physician-scientist-educator. He is Professor and Vice Chair for Research in the Department of Rehabilitation Medicine at the University of Washington in Seattle, WA. He is also Associate Director of the Amputation Rehabilitation Fellowship at VA Puget Sound Health Care System and is a Core Investigator in the VA Rehabilitation Research and Development Center for Limb Loss and Mobility (CLiMB). Dr. Morgenroth has been leading multidisciplinary amputation rehabilitation clinics serving a five-state area in the northwest United States for the past 16 years. His research has been funded by the NIH, VA and Department of Defense and is focused on optimizing the prosthesis prescription process, improving mobility and stability, and reducing secondary disabling musculoskeletal pain in those with limb loss. He is also a dedicated educator on the subjects of amputation rehabilitation, prosthetics, and gait biomechanics, and mentor for medical students, PM&R and prosthetic residents, clinical fellows, Rehabilitation Science Ph.D. students, and post-doctoral fellows.

Amy Herrold, Ph.D.

Dr. Herrold is a neuroscientist focused on developing neuroscience-informed treatments for co-occurring neuropsychiatric conditions. Her overall hypothesis is that exacerbated brain dysfunction with the co-occurring conditions leads to exacerbated behavioral dysfunction and symptom severity. Customizing neuromodulatory treatments to treat this dysfunction are warranted given the heterogeneity of these conditions. Dr. Herrold led a successful pilot, open label study combining the non-invasive neuromodulatory treatment transcranial magnetic stimulation (TMS) with LoveYourBrain yoga for Veterans with co-occurring mild traumatic brain injury and chronic musculoskeletal pain. Dr. Herrold is currently developing a customized TMS site of stimulation for co-occurring alcohol use disorder and mild traumatic brain injury, which will be tested in a randomized controlled trial. Dr. Herrold is the recipient of a Department of Veterans Affairs, Rehabilitation Research and Development, Career Development, Merit and Small Projects in Rehabilitation Research Awards. Dr. Herrold holds dual faculty appointments at Edward Hines Jr., VA Hospital and Northwestern University, Feinberg School of Medicine, Department of Psychiatry and Behavioral Sciences.

Mara Yale, Ph.D., GCFP, SEP

Mara Yale, Ph.D., directs Pediatric Stroke and Brain Injury Education and Outreach at Massachusetts General Hospital, reaching an international audience. She co-chairs the I-ACQUIRE Parent Council and co-leads CP Soccer New England. Mara brings scientific inquiry and collaboration to her work based on prior careers in geophysics and software engineering. Mara is a Guild Certified Feldenkrais Practitioner, Somatic Experiencing Practitioner, has trained in Hand-in-Hand Parenting, holds a Ph.D. in geophysics, and played Division I ice hockey. She lives near Boston with her two teens, one of whom had a perinatal stroke.

Andrew Hansen, Ph.D.

Andrew Hansen is a Research Biomedical Engineer at the Minneapolis VA Health Care System and a Professor of Rehabilitation Science & Biomedical Engineering at the University of Minnesota. He was a co-founder and director of the Minneapolis Adaptive Design & Engineering (MADE) Program from 2010 to 2023. He is now the founder and director of the VA's Rehabilitation & Engineering Center for Optimizing Veteran Engagement and Reintegration (RECOVER), which is the topic of his presentation today.

Cory Christiansen, PT, Ph.D.

Cory Christiansen, PT, Ph.D., is a professor in the Department of Physical Medicine & Rehabilitation at the University of Colorado and a rehabilitation researcher within the VA Eastern Colorado Healthcare System. He directs the Interdisciplinary Movement Science Lab on the Anschutz Medical Campus and his research focuses on optimizing rehabilitation for older adults with movement dysfunction from a biopsychosocial perspective with particular emphasis on exercise interventions. He has conducted clinical trials research for the past 17 years, including a primary line of research related to exercise for people with Parkinson disease.

Funding Representatives

Joe Bonner, Ph.D.

NIH National Center for Medical Rehabilitation Research (NCMRR)
Health Scientist Administrator
Program Officer

Ralph Nitkin, Ph.D.

NIH National Center for Medical Rehabilitation Research (NCMRR)
Deputy Director

Brian Schulz, Ph.D.

Veterans Affairs Rehabilitation Research a& Development (VA RR&D)
Scientific Program Manager for Rehabilitation Engineering and Prosthetics/Orthotics

Timothy Brindle, Ph.D.

Administrator and Program Officer Veterans Affairs Rehabilitation Research & Development (VA RR&D)
Scientific Program Manager for Musculoskeletal Health & Function

Radha Holavanahalli, Ph.D.

National Institute on Disability, Independent Living and Rehabilitation Research (NIDILRR)
Rehabilitation Program Specialist

Patricia Henry, Ph.D.

Congressionally Directed Medical Research Programs, United States Department of Defense
Program Manager

Daniel Monson, Ph.D.

Congressionally Directed Medical Research Programs, United States Department of Defense
Program Manager

Day 2 Speakers

Keynote: Michael L. Boninger, M.D.

Dr. Michael Boninger is a Distinguished Professor in the Department of Physical Medicine & Rehabilitation at the University of Pittsburgh, School of Medicine. He has joint appointments in the Departments of Bioengineering, Rehabilitation Science and Technology, and the Clinical and Translational Science Institute as well as the McGowan Institute of Regenerative Medicine. He is also the Associate Dean for Sustainability in the School of Medicine and responsible for running the school's Office of Sustainability in Medicine. Finally, he is the Chief Medical Sustainability Officer for UPMC. In these sustainability roles, Dr. Boninger is working to reduce the carbon footprint of UPMC and the School of Medicine and increase education and engagement in climate health. Dr. Boninger has an extensive publication record of well over 300 peer-reviewed papers and has receive substantial funding from numerous agencies including the Department of Veterans Affairs, the National Institutes of Health, Department of Defense, and National Institute on Disability, Independent Living, and Rehabilitation Research. His central research focus is on enabling increased function and participation for individuals with disabilities through development and application of assistive, rehabilitative, and regenerative technologies. Dr. Boninger's students have won over 50 national awards. Dr. Boninger holds 4 United States patents and has received numerous honors, including being inducted into the National Academy of Medicine (formerly Institute of Medicine) of the National Academy of Science.

Neha (Tej) Mehta, PT, Ph.D.

Tej Mehta (she/her) is a Physical Therapist and a Ph.D. student in the New York University (NYU) Rehabilitation Sciences program. She works with Dr. Anat Lubetzky in the Physical Therapy Sensorimotor Laboratory and Dr. S. Farokh Atashzar in the Medical Robotics and Interactive Intelligent Technologies (MERIIT) laboratory at NYU. Tej completed her MS in Healthspan Promotion and Rehabilitation from the University of Illinois Chicago (UIC) in 2023. During her MS, she worked at the Cognitive Motor Balance Rehabilitation Laboratory at UIC, where she studied the effect of vestibular dysfunction on reactive balance control in older adults using slip perturbation balance assessment on a motorized treadmill and presented the findings in the American Physical Therapy Association Combined Section Meeting 2023.

With the changing world demographics and increased incidence of balance dysfunction and cognitive decline in the geriatric population, Tej is interested in understanding neural correlates of balance control. She hopes to develop clinically translatable, innovative, and cost-effective rehabilitation measures to improve the balance, cognition, and overall quality of life of elderly individuals.

Sharon Stansfield, Ph.D., MSE

Sharon Stansfield received her BA in Computer Science and Mathematics from the State University of New York at Potsdam, NY in 1980. She received her MSE in image processing in 1984 and her Ph.D. in robotics in 1988, both from the University of Pennsylvania.

She worked at Sandia National Laboratories in Albuquerque, NM from 1992-2000 as a senior member of technical staff performing research in robotic grasping and perception as well as virtual reality for small team emergency medical response training. In 2000, she joined the computer science faculty at Ithaca College where she was chair for many years. During that time, she collaborated with faculty in the departments of Occupational Therapy, Physical Therapy and Psychology on research in the use of virtual reality for physical therapy and mobile robotics for pediatric rehabilitation. In January of 2020, she co-founded Assistance in Motion, a start-up company aimed at commercializing a robotic mobility device, the WeeBot, for infants with motor impairment. In 2022, the company received an NSF SBIR Phase 1 grant to commercialize the WeeBot.

Kim Ingraham, Ph.D.

Kim Ingraham is an Assistant Professor of Electrical & Computer Engineering and an Adjunct Assistant Professor of Mechanical Engineering at UW. She is also affiliated with UW CREATE (Center for Research and Education on Accessible Technology and Experiences). She directs the Ingraham Lab, which is focused on advancing human mobility using assistive robotic devices, such as exoskeletons, prostheses, and powered wheelchairs.

Dr. Ingraham has an interdisciplinary training background and has earned degrees in Biomedical Engineering (BE 2012, Vanderbilt University) and Mechanical Engineering (MS, PhD 2021, University of Michigan). She was a CREATE postdoctoral fellow in Rehabilitation Medicine at the University of Washington. Prior to beginning graduate school, she worked as a Research Engineer at the Shirley Ryan AbilityLab (formerly the Rehabilitation Institute of Chicago).

In her past professional and doctoral research, Dr. Ingraham has developed and evaluated physiologically-inspired control systems for a variety of assistive devices, including bionic lower-limb prostheses, robotic exoskeletons, and powered wheelchairs for young children with disabilities.

Colleen Johnson, PT, DPT

Colleen Johnson is a Board Certified Clinical Specialist in Neurologic Physical Therapy and serves as a Senior Physical Therapist II at Shirley Ryan AbilityLab. With extensive experience in Spinal Cord Injury Rehabilitation, Wheelchair Seating and Positioning, Clinical Quality, and Outcomes Research, Colleen is dedicated to advancing healthcare through innovative project management.

Colleen holds a Doctor of Physical Therapy degree from Shenandoah University and a Bachelor of Science degree from the University of Wisconsin–La Crosse. As a Lean Six Sigma Green Belt and co-leader of the Allied Health Skincare Champions Committee, she has notably enhanced clinical outcomes and optimized processes related to pressure injury prevention and skin integrity at Shirley Ryan AbilityLab. Driven by a passion for integrating clinical expertise with analytical solutions, Colleen is committed to achieving measurable improvements in patient care and outcomes.

Akhil Mohan, Ph.D.

Akhil Mohan completed his Ph.D. in Biomedical Devices and Technology from the Indian Institute of Technology Madras in 2019. Dr. Mohan is currently a research associate in Dr. Ela Plow's lab at the Lerner Research Institute of the Cleveland Clinic, where his work focuses on investigating the efficacy of novel brain stimulation and rehabilitation treatments for post-stroke survivors with severe upper limb hemiplegia. Dr. Mohan is the recipient of the prestigious NINDS StrokeNet Clinical Research Training Fellowship and IBM-Cleveland Clinic Quantum Computing Residency Fellowship. Dr. Mohan aims to create analytical tools for characterizing the severity of neurological dysfunction, potentially accelerating the design and development of targeted biomedical modalities for upper limb rehabilitation.

Brooke Slavens, Ph.D., MS

Dr. Brooke A. Slavens is the Richard and Joanne Grigg Professor of Mechanical Engineering and Biomedical Engineering at the University of Wisconsin-Milwaukee. She earned her B.S.E. in Biomedical Engineering from the University of Iowa and her M.S. and Ph.D. in Biomedical Engineering from Marquette University. Dr. Slavens completed a postdoctoral fellowship in pediatric mobility at the Orthopaedic and Rehabilitation Engineering Center at Marquette University and the Medical College of Wisconsin. Her research is centered on the prevention of secondary medical conditions in individuals with spinal cord injuries across the lifespan. Her work aims to enhance upper extremity function and develop personalized rehabilitation strategies to reduce pain and prevent pathology.

Sam Nemanich, Ph.D., MSCI

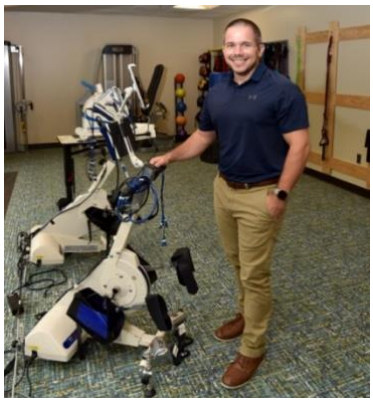
Dr. Sam Nemanich is an Assistant Professor in the Department of Occupational Therapy at Marquette University and director of the Pediatric Movement and Neuroscience Laboratory. His research focuses on understanding motor learning and development in children with and without motor disabilities, such as cerebral palsy, to advance neurorehabilitation therapies that improve function and quality of life. His work combines behavioral and neurophysiologic methods such as EEG and non-invasive brain stimulation and reflects his complementary training in biomedical engineering, movement neuroscience, and translational research.

Kevin McLaughlin, DPT

Dr. Kevin McLaughlin is an Assistant Professor at the Johns Hopkins School of Medicine in the Department of Physical Medicine and Rehabilitation. He received his Doctorate of Physical Therapy degree from Temple University degree in 2012, later completing a residency at Johns Hopkins in orthopaedic physical therapy and fellowship at Regis University in orthopaedic manual physical therapy. Dr. McLaughlin's research is focused on improving healthcare delivery for patients with musculoskeletal pain. In these efforts, he serves as MPI on two clinical trials examining the effectiveness of telehealth physical therapy for patients with chronic low back pain. He also leads the Low Back Pain Precision Medicine Center of Excellence at Johns Hopkins, where he and his team utilize data from the electronic health record to improve the effectiveness and efficiency of care delivered to patients with low back pain across the Johns Hopkins Healthcare System. Dr. McLaughlin has received funding from the NIH, PCORI, AHRQ, and multiple foundations, including the Foundation for Physical Therapy and LeaRRn, to support his research efforts.

Christopher DiCesare, Ph.D.

Dr. DiCesare is a Managing Scientist in Biomechanics at Exponent, where he assists companies in the early stages of human-centric product development. He has over 10 years of experience evaluating human health and performance across the lifespan, with specific expertise in laboratory-based and real-world experimental design, wearable and digital health technology development and validation, and human behavioral analytics strategy implementation. Prior to Exponent, Dr. DiCesare was a Research Fellow in the Department of Mechanical Engineering at the University of Michigan and Clinical Research Coordinator in the Division of Sports Medicine at Cincinnati Children's Hospital. He has also served as an adjunct faculty member at both the undergraduate and graduate levels at Mount St. Joseph University, Xavier University, and the University of Michigan.



Brad Willingham, Ph.D.

Dr. Willingham is an NIH-trained physiologist with over a decade of experience working in both the clinical and research domains of rehabilitation. He started his career in rehabilitation working as an exercise physiologist, where he obtained vast experience in treating patients with MS and spinal cord injury. Through this experience, he developed a keen interest in scientific questions that could inform clinical practice. Since beginning his research journey over a decade ago, Dr. Willingham has maintained a steadfast commitment to engaging in research directly aimed at improving the health, function, and quality of life for individuals with MS. His career has spanned various environments, including healthcare, academia, and government. In his current role as Director of MS Research, he continues to pursue a patient-centered rehabilitation research agenda, focusing on translating technological innovations into more effective and accessible care strategies for people with MS.

Amy Kemp, Ph.D., CCC-SLP

Dr. Amy Kemp, Ph.D., CCC-SLP, is an assistant professor at Washington State University.

Dr. Kemp's current research focuses on applying implementation science to develop accessible, efficient, and effective rehabilitation protocols for healthcare providers in rural areas. Her research focuses primarily on improving neurorehabilitation practices and enhancing the quality of life and functional outcomes for individuals who have experienced acquired brain injuries.

Mary Jackson, OTD, OTR/L

Dr. Mary Jackson, OTR/L, OTD, completed her Occupational Therapy Doctorate in 2020 followed by several years of clinical work in outpatient neurorehabilitation. While working in this setting she collaborated with physical therapy and neuropsychology to develop an evidence-based, interdisciplinary treatment guide for long-COVID, dysautonomia, and other fatigue syndromes. This experience spurred her interest in research, resulting in her current position as a T-32 post-doctoral research fellow at the University of North Carolina at Chapel Hill in the Program on Integrative Medicine.
Her research interests include the role of mind-body practices in the treatment and management of long-COVID and concussion. She is also interested in the integration of mind-body practices into standard clinical care to support the well-being of providers.

Theresa Hayes Cruz, Ph.D.

Theresa Hayes Cruz, Ph.D., is the Director of NCMRR, which, through basic, translational, and clinical research, fosters the development of scientific knowledge needed to enhance the health, productivity, independence, and quality-of-life of people with physical disabilities.

As NCMRR Director, Dr. Cruz led the development of the 2021 NIH Research Plan on Rehabilitation and planned the NIH-wide conference, "Rehabilitation Research 2020: Envisioning a Functional Future." She represents NIH on various federal committees, including the Interagency Committee on Disability Research.

In addition to her NCMRR duties, Dr. Cruz is a team lead in the NIH Brain Research through Advancing Innovative Neurotechnologies® (BRAIN) Initiative, where she co-manages a grant portfolio in the areas of neurotechnology development, validation, and translation.

Introductions and Session Moderators

Rick Segal, PT, Ph.D., FAPTA

Dr. Segal is a Professor Emeritus in the Department of Health Sciences and Research and past Chair of the Department of Rehabilitation Sciences at the Medical University of South Carolina. After several years as a practicing Physical Therapist in Washington, D.C., he went to the University of Virginia to earn his Ph.D. in Anatomy and Neuroscience. He spent twenty-two years as a faculty member at Emory University before serving eight years as Director of the Division of Physical Therapy at the University of North Carolina at Chapel Hill. Dr. Segal is active in faculty and research mentorship and is a strong advocate for translational research. He has over 30 years of experience carrying out rehabilitation-oriented Neuroscience research on motor control and spinal circuits. Dr. Segal was part of the NIH-funded program project grant entitled "spinal circuits and the musculoskeletal systems" for 22 years. He was a mentor in the ERRIS grant writing workshops for 10 years, PI/Co-PI for 11 years, and continues on the Executive Committee.

He is working on translating research into practice through students using education research. In 2018 he coordinated the first grantsmanship and mentorship in education research (GAMER) grant writing workshop. He served on the Executive Committee of the NIH funded Interdisciplinary Rehabilitation Engineering Career Development Program (IREK K 12), where he helped engineers make their research more applicable for rehabilitation of patients. He also was a mentor and on the advisory board of the NIH funded RMSTP program. Finally, he is the Education Director of the NIH-funded P2C National Center of Neuromodulation for Rehabilitation (NC NM4R) along with being the lead of the Medical Rehabilitation Research Resource (MR3) Network Coordinating Center for the six P2C's across the country.

Dr. Segal was selected as a Catherine Worthingham Fellow of the American Physical Therapy Association (APTA) in 2009, selected by the Academy of Physical Therapy Research as the John P. Maley Award winner for research leadership in 2023, and is a member of Global Membership Committee and Neuroscience Scholars Selection Committee of the Society for Neuroscience.

Randal Davis, MBA

In February 2019, Randal Davis was appointed the Director of Strategic Research Initiatives for the Medical University of South Carolina (MUSC) College of Health Professions and is an Assistant Professor. Prior to this, he was on the ground floor of the NIH's Roadmap Initiative that, in 2006, transformed the General Clinical Research Centers program into the Clinical and Translational Science Award (CTSA)–leading to MUSC establishing the South Carolina Clinical & Translational Research (SCTR) Institute. As the first SCTR Project Director, he oversaw strategic planning and evaluation, directed the project management office, guiding the T32 (TL1) and K12 (KL2) career development programs, engaged community and national stakeholders, and guided the science related programs (retreats, pilot studies, translational technologies.) Simultaneously, Mr. Davis served as the university Director of Grants Development for the Office of Research Development, leading the development of complex center grants, training grants, and other types of infrastructure grants sponsored by the NIH, National Science Foundation, Department of Defense, and other federal funding agencies. He has a broad background in leading national projects and strategic planning; measuring and reporting programmatic successes; proactively pursuing continuous process improvement; engaging communities for positive action and partnership building; and major center grant program development (contributions to date have leveraged more than $350M in extramural award funding).

Ralph Nitkin, Ph.D.

Dr. Nitkin is the Deputy Director for the National Center for Medical Rehabilitation Research (NCMRR), which is located within the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) at the NIH. He received his undergraduate and Master's degrees from the Massachusetts Institute of Technology in the area of biological sciences, and his Ph.D. from the University of California, San Diego in cellular neurobiology. His postdoctoral studies at Stanford University and later work as an assistant professor at Rutgers University focused on the cellular and molecular basis of nerve-muscle synapse formation. For the past 34 years he has worked as a science administrator at the NICHD, first in the area of mental retardation and developmental disabilities and for the last 24 years in the area of medical rehabilitation.

Within the NCMRR, Dr. Nitkin is particularly involved with research on the fundamental mechanisms and substrate of rehabilitation, including neuroplasticity, physiology, exercise, and other adaptive changes. He has been heavily involved in the formation of the rehabilitation research infrastructure networks (www.ncmrr.org), the annual rehabilitation grant-writing workshop (formerly ERRIS, currently called TIGRR), and special career-development networks for clinical neurorehabilitation, for physical/occupational therapists, and more recently for rehabilitation engineers. He has helped promote NIH research initiatives in such diverse areas as genomic factors that affect rehabilitation outcomes, promotion of exercise and diet in children with disabilities, clinical trial design in rehabilitation, technologies for healthy independent living, and research workforce diversity. He looks forward to continuing to work with rehabilitation researchers as well as those from allied fields.

Miriam Rafferty, PT, DPT, Ph.D.

Dr. Miriam Rafferty is a Research Scientist and the Director of Implementation Science at the Shirley Ryan AbilityLab, as well as an Assistant Professor at Northwestern University's Feinberg School of Medicine in the Departments of Physical Medicine & Rehabilitation and Psychiatry & Behavioral Science. She also is a board certified neurologic physical therapist specializing in the proactive rehabilitation of people with Parkinson's disease, stroke, and other conditions. Dr. Rafferty uses implementation science methodology to study and facilitate the adoption of evidence-based practices and novel technologies in real-world rehabilitation contexts.

Amrita Sahu, Ph.D.

Dr. Amrita Sahu is an Assistant Professor in the Department of Physical Medicine and Rehabilitation at the University of Pittsburgh. She holds a secondary appointment at the Department of Environmental and Occupational Health and is a core faculty member of the McGowan Institute of Regenerative Medicine at the University of Pittsburgh.

Dr. Sahu received her bachelor's in biomedical engineering at the Manipal University of Technology in India in 2011. She received her master's in biomedical engineering from Carnegie Mellon University in 2014 where her research work focused on developing single cell extracellular matrix scaffolds for targeted stem cell delivery-based therapeutics. In 2019, she received her Ph.D. in Environmental and Occupational Health at the University of Pittsburgh. Her dissertation focused on developing anti-aging therapeutics to improve aged skeletal muscle regenerative capacity. She won the Delta Omega award for her doctoral research. Currently, her research focuses on developing regenerative rehabilitative strategies to improve skeletal muscle physiology and brain connectomics in populations exposed to heavy metals in their drinking water. Using pre-clinical mouse models, her laboratory focuses on identifying therapeutic targets in circulating extracellular vesicles for improving tissue health after arsenic exposure. At the McGowan Institute, she leads the Scientific Equity initiative as the member of its DEI committee. The goal of this initiative is to develop and implement strategies to make regenerative medicine inclusive and equitable–ensuring that the benefits of research are shared by all.

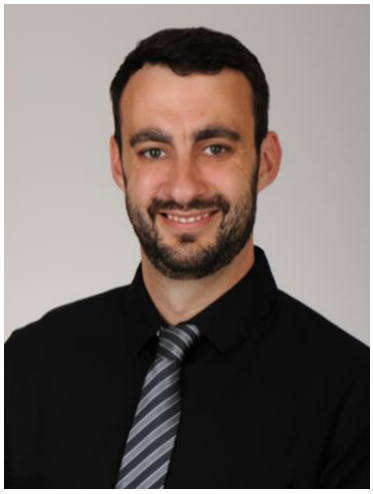
Jessica Edelstein, Ph.D., OTR/L

Dr. Jessica Edelstein is an occupational therapist and early career scientist in the field of health services research, specializing in examining access to rehabilitation services and patient-centered outcomes. She completed her postdoctoral research fellowship at Colorado State University, earned a PhD in Health-Related Sciences at Virginia Commonwealth University, and holds a Master's degree in Occupational Therapy from the University of Indianapolis. Dr. Edelstein's research focuses on developing evidence-based rehabilitation service delivery models to enhance rehabilitation care delivery and optimize patient-centered outcomes. Currently, Dr. Edelstein is a Research Scientist I at Shirley Ryan AbilityLab and a Research Assistant Professor at Northwestern University. She is continuing to characterize the relationship between rehabilitation service delivery factors and patient-centered outcomes and starting to gain experience with implementation science. Dr. Edelstein is passionate about translating research findings into actionable policies and practices to drive positive chances in healthcare systems.

Allen Heinemann, Ph.D.

Dr. Heinemann's research interests focus on health services research, psychosocial aspects of rehabilitation including substance abuse, and measurement issues in rehabilitation. He is the author of more than 300 articles in peer-reviewed publications and is Co-Editor-in-Chief, Archives of Physical Medicine & Rehabilitation. Since 1985, Dr. Heinemann has worked at Shirley Ryan AbilityLab (formerly the Rehabilitation Institute of Chicago (RIC)) where he directs the Center for Rehabilitation Outcomes Research. The Center manages a $9.85 million portfolio of research projects funded by the National Institute on Disability, Independent Living and Rehabilitation Research, the National Institutes of Health, the Craig H. Neilsen Foundation, the Department of Defense and other sources. The Center also manages the Rehabilitation Measures Database, a free online resource with more than 550 summarized rehabilitation measures as well as educational resources to help users get the most out of the database.

Dr. Heinemann, who is also Professor of Physical Medicine and Rehabilitation, Emergency Medicine and Medical Social Sciences in the Northwestern University Feinberg School of Medicine, earned his doctoral degree in clinical psychology at the University of Kansas with a specialty focus in rehabilitation. He completed an internship at Baylor College of Medicine in Houston and then accepted an assistant professor position in the Department of Psychology at Illinois Institute of Technology. Dr. Heinemann is a diplomate in Rehabilitation Psychology (ABPP), and a fellow of the American Congress of Rehabilitation Medicine (ACRM) and the American Psychological Association (APA Division 22). He is a past president of ACRM and the Rehabilitation Psychology Division of the American Psychological Association. He serves on the editorial boards of the Journal of Head Trauma Rehabilitation and Rehabilitation Psychology. He is the recipient of the APA Division 22 Roger Barker Distinguished Career Award. He also serves on the Standing Committee of Medical and Vocational Experts for the Social Security Administration's Disability Programs.



Corey Morrow, Ph.D., MOT, OTR/L

Dr. Morrow is an assistant professor in the Division of Occupational Therapy at the Medical University of South Carolina. Dr. Morrow's research interests include increasing access to rehabilitation services and technology using big data and health economics. Currently, Dr. Morrow is funded for projects related to improving wheelchair provision policy. He is an American Occupational Therapy Foundation Health Services Research grant awardee and a LeaRRn Scholar partnered with the Center for Assistive Technology at the University of Pittsburgh.

Warren D. Lo, M.D.

Dr. Lo is attending pediatric neurologist at Nationwide Children's and Clinical Professor of Pediatrics and Neurology at The Ohio State University College of Medicine. His clinical and research interests center on stroke in infants and children, and the effect of rehabilitation upon motor recovery. He is a multiple Principal Investigator in the NINDS StrokeNet supported I-ACQUIRE trial and is a site investigator in several stroke related observational studies and trials.

Matthew Petrucci, Ph.D.

Matt is the Scientific Program Manager for the Mobilize and Restore Centers at Stanford University. He is interested in developing digital health tools that optimize human mobility and performance. His research has focused on cross-sectional, longitudinal, translational, and feasibility studies in people with Parkinson's disease, people with multiple sclerosis, athletes, and firefighters. These studies included evaluating objective biomarkers of disease or performance, optimizing and evaluating novel treatments and interventions, developing real-time closed-loop algorithms, and clinical trials. He helps run the various scientific outreach and training programs of the Mobilize and Restore Centers.

Lisa Juckett, Ph.D., OTR/L

Dr. Lisa Juckett is an Associate Professor at The Ohio State University, an Investigator for the MR3's Learning Health Systems Rehabilitation Research Network, and an occupational therapist by training. Her current research is funded by the NIA, AOTF, and the ACL and focuses on bridging the gap between empirical discoveries and the use of these discoveries in real-world practice settings, particularly in organizations that serve the older adult population.

MR3 Network Action Steps for Diversity, Equity, and Inclusion

- Recruiting participants that reflect the population(s) involved in rehabilitation.
- Developing pathways for younger, underrepresented individuals to enter the rehabilitation research workforce
- Retaining and facilitating growth of underrepresented rehabilitation researchers.
- Rapidly and effectively exchanging new knowledge about rehabilitation science to diverse patient populations.

For More Information, Visit
ncmrr.org/diversity

Day 1 Abstracts

Session 1: Clinician Research and Community Engagement–Capacity Building

Fueling Innovation: Catalyst Grants Spark Interdisciplinary Rehabilitation Research

Melissa Briody, Bridget Fowler King, James Silwa, Richard Lieber
Shirley Ryan AbilityLab, Northwestern University, Hines VA Hospital

Translational rehabilitation research and innovative thinking requires meaningful collaboration between researchers and clinicians, yet these opportunities are often not prioritized or incentivized. To address this gap, Shirley Ryan AbilityLab initiated the Catalyst Grant Program in November 2019. Our goal was to create interdisciplinary research teams throughout the organization that produce meaningful patient outcomes in the clinic and in the community. This presentation details the methods, outcomes, and lessons learned from administering this strategic initiative over the past five years. Organizational leaders designed the program to include four grant types (Project, Quality, Mentorship, and Foundational), to form a comprehensive program for all employees, including those with no research experience to career scientists. From 2019 to 2024, there were six rounds of Catalyst Grant funding. In total, 943 applicants contributed to 283 applications that resulted in 72 awards totaling $1.25M in funding. Applicants came from diverse professions, with 64% Non-researchers and 36% Researchers with further breakdown of 42% Allied Health, 36% Researchers/Engineers and 9% Physicians, 5% Nurses, and 8% Other staff (n=943). The interdisciplinary teams supported through the Catalyst Grant Program have demonstrated a high degree of scientific productivity. As of February 2024, the 55 awards in the first five cycles totaled a $980k investment that resulted in 14 publications, 12 external grant applications, and 8 external grant awards totaling $7.8M. These results demonstrate the program's effectiveness in building and sustaining productive clinical research partnerships, fostering innovation, and cultivating a research-driven culture within a rehabilitation hospital.

It's All About Communication! Teaching Researchers to Talk to Clinical Collaborators

Melissa Briody. Bridget Fowler King, James Silwa, Richard Lieber
Shirley Ryan AbilityLab, Northwestern University, Hines VA Hospital

Effective clinician-researcher partnerships rely on clear communication, yet these two groups often struggle to speak a common language. We have developed what we term, "The IdeaLab," an initiative of Shirley Ryan AbilityLab and the Center for Smart Use of Technology to Assess Real World Outcomes (C-STAR), that provides a platform for investigators to present early-stage research ideas and receive expert guidance from clinicians. From 2021-2024, we held 20 IdeaLabs with an average of 35 employees per event (35.4±10.2). Participants included 45.6% Researchers/Engineers, 32.6% Allied Health, 11.4% Other staff, 9.0% Physicians, and 1.3% Registered Nurses (n=708). The success of these events hinges on presenters effectively communicating their research ideas to the interdisciplinary audience to produce valuable discussions of usability, feasibility, clinical applicability and potential impact. Drawing from our experience, we identified three key concepts and incorporated them into a template for successful IdeaLab presentations: (1) Start with the idea. Presenters must concisely articulate their idea and their understanding of its significance. (2) Simplify the content. Presenters must provide essential information with minimal technical jargon. Overly detailed methodology distracts from the clinical need and impact. (3) Focus on the nail. Presenters should aim to identify real clinical problems and tailor their solution ("the hammer") accordingly to increase the potential for impact. For some investigators,

the IdeaLab may be their first meaningful interaction with clinical counterparts. By equipping researchers with effective interdisciplinary communication skills, we foster a culture of collaboration that empowers both researchers and clinicians to address real-world challenges for rehabilitation populations.

Intentional Inclusion of Navigator Scientists to Enhance the Relevance and Sustainability of Peer Support Interventions

Susan Magasi, Hilary Marshall, Audrey Phillips, Christina Papadimitriou, Rachel Adler, John Abbate, Ronnell Booze, Robert Green, Ryann Browne
University of Illinois, Chicago, Oakland University, University of Illinois, Champaign Urbana, Shirley Ryan AbilityLab

We are approaching a quarter of a century of enshrined civil rights legislation that mandates full and equal participation of people with disabilities across all aspects of society. Yet, the 61 million Americans living with disabilities continue to experience well-documented barriers to health, healthcare, and community living at the nexus of disability status, social determinants of health and intersectional minoritized identities. In our increasingly interconnected world, there is a critical need to diversify our approach to science and intervention to break down systemic barriers to care and community participation. mENTER is a 12-month mHealth-enabled peer support intervention aimed at people with acquired physical disabilities transitioning from in-patient rehabilitation to independent living. This evidence-informed behavioral intervention was conceptualized using community-based participatory approaches between academic rehabilitation researchers, disability rights advocates at a Center for Independent Living, and a Medicaid managed care organization. As the project has evolved so too has our approach to transdisciplinary science and the ways to intentionally increase engagement of people with lived experience to promote both program relevance and the quality of the science. Specifically, we created a "navigator scientist" approach that embeds people with disabilities as co-designers, interventionists, and evaluators of the mENTER training, intervention, and technology infrastructure to support this complex behavioral intervention. In this presentation, we will describe the strategies that we have used to embed navigator scientists in our transdisciplinary team that includes rehabilitation researchers, behavioralists and implementation scientists, and computer scientists. We will emphasize strengths, challenges, and creative possibilities inherent in this approach.

Development of a Central Research Infrastructure that Supports Interdisciplinary Clinical Research and the Adoption of Evidence-Based Practices in the Healthcare Settings

Henry Hrdlicka, Pete Grevelding, David Rosenblum, Amanda Meyer, Lorraine Cullen, Roslyn Gilhuly, Diana Pernigotti, John Corbett, Socheata Morley, Emily Meise, Raquel Conklin
Gaylord Specialty Healthcare

Healthcare professionals in non-academic settings, at all levels of training and experience, have the ability to identify gaps in knowledge, develop novel research ideas, and adapt known protocols to meet patient needs. However, acting upon these ideas is often daunting, involving hours of discretionary time and effort. To address this, Gaylord Specialty Healthcare invested in the development of a centralized research infrastructure–The Milne Institute for Healthcare Innovation. The Milne Institute supports Gaylord's healthcare professionals in

conducting clinical research, evidence-based projects (EBPs), and quality initiatives (QIs) to improve patient care and outcomes. To offset the extraclinical nature of research, the Milne Institute's fulltime research staff not only mentor, educate, and guide Gaylord's healthcare professionals, but they also assist them through all project phases, including: idea development; study design; IRB application preparation; participant enrollment; data collection and analysis; and preparation and submission of conference abstracts and manuscripts. Since 2020, this emphasis has increased Gaylord's annual average number of IRB-approved research projects (from 7-to-24), accepted conference submissions (from 4-to-10), and accepted manuscripts (from 0-to-3). Further, this investment has resulted in a broader culture of innovation, with 52 healthcare professionals, representing 14 different departments, currently acting as a co-investigator on one or more IRB-approved research studies, with even more staff supporting research, QIs, and EBPs in other ways. By adopting a centralized research infrastructure, a culture of research and innovation can be created. This allows healthcare professionals to further engage in meaningful initiatives and improve patient outcomes through the development of new EBPs.

Session 2: Augmented Therapy–Rehabilitation Technology

Insights from Implementing Wearable Technologies for Stroke Rehabilitation Outside Research Laboratories

Abed Khorasani, Cynthia Gorski, Vivek Paul, Joel Hulsizer, Nathan Hung, Prashanth Prakash, Marc Slutzky
Northwestern University

Stroke is a leading cause of permanent disability worldwide, with 60% of survivors experiencing upper limb impairment six months post-stroke. While spontaneous recovery plateaus within six months, targeted motor rehabilitation can improve function beyond this period. However, resource constraints limit access to outpatient therapy, highlighting the need for cost-efficient and accessible treatments. We developed a novel, wearable myoelectric interface for neurorehabilitation (MINT), providing affordable, gamified, at-home rehabilitation for moderate to severe stroke patients. MINT conditioning reduces abnormal arm muscle co-activation and enhances movement. In a transdisciplinary, randomized, sham-controlled trial with 59 stroke survivors, the experimental group experienced significantly reduced abnormal muscle co-activation and significantly improved arm function after six weeks of at-home MINT use, while the sham control group did not improve. Our approach addresses key challenges in at-home stroke rehabilitation: 1) Patient motivation: collaborating with software engineers, we created engaging game environments to maximize patient motivation and adherence to at-home rehabilitation. 2) Patient progress monitoring: We developed an automated pipeline that tracks patient progress, including training repetition counts, game success rates, and muscle activities. We faced multiple challenges in implementing this at-home trial, including a high drop-out rate, mostly due to external factors unrelated to the intervention, insufficient communication, and computer illiteracy. Addressing these challenges will involve enhancing patient support and improving usability, and is critical to future home-based therapies.

Vagus Nerve Stimulation Paired With Physical Therapy to Promote Mobility Rehabilitation in Chronic Ischemic Stroke

Matthew Picard-Fraser, Laura Patrick, Kyle Reedy, Teresa Kimberley
MGH Institute of Health Professions

Paired Vagus Nerve Stimulation is a breakthrough, FDA approved intervention that has been shown to be 2 to 3x more effective than intensive rehabilitation alone in the treatment of chronic moderate to severe upper extremity impairments following an ischemic stroke. It is understood from animal models that Paired VNS promotes these improved outcomes by driving targeted plasticity when paired with a motor task. Preclinical models have shown that these gains can be achieved in variety of tasks when training is paired with VNS and the mechanism is not unique to upper extremity function. Given this mechanistic foundation, it is hypothesized that Paired VNS may also be an effective intervention for post-stroke mobility rehabilitation. Here, we present a case series of patients who received VNS combined with outpatient physical therapy to improve locomotor function. The physical therapy intervention, which was paired with cyclical VNS activated by the patient using a self-swipe technique, followed clinical practice guidelines and emphasized high-intensity gait training. Patients were assessed using a battery of outcome measures, including the 10 Meter Walk Test and 6 Minute Walk Test each month throughout the intervention period with long-term follow-up planned at 3 and 6 months.. We describe the clinical implementation of the intervention and the key factors of success in the creation and maintenance of an interstate academic and clinical partnership. We will share results from the first participants to complete the intervention, highlight the lessons learned, and discuss the interdisciplinary collaboration required to maximize patient benefit.

Soft Wearable Robot that Provides Anti-Gravity Arm Support Improves Upper Limb Movement Quality in Individuals Post-Stroke

Prabhat Pathak, James Arnold, John Paul Bonadonna, Carolin Lehmacher, Connor McCann, Tanguy Lewko, Yichu Jin, Sarah Cavanaugh, David Pont-Esteban, Kelly Riche, David Lin, Conor Walsh
Harvard University, Massachusetts General Hospital

Post-stroke motor impairments limit the ability to functionally move the arm against gravity which leads to a reduction in upper limb movement quality. Hence, providing anti-gravity arm support is widely adopted as an effective strategy in motor rehabilitation to enable functional upper limb movement. Recently, we developed a soft wearable shoulder robot that lifts the arm against gravity using a pneumatic actuator attached underneath the arm on a custom-made shirt. This study aims to evaluate the effectiveness of the soft wearable robot in improving upper limb movement quality for individuals post-stroke. We recruited four individuals post-stroke (age = 60.5±18.3 years, UE-FMA scores = 45.5±11) and asked them to lift their arm against gravity to 90° flexion and abduction, three times each with the robot turned on and off. We used an optical motion capture system to record and evaluate upper limb movement by calculating 1) shoulder elevation/depression range of motion (ROM), 2) end-effector movement quality (hand-path-ratio of the three-dimensional (3D) hand center of mass (COM) trajectory), and 3) trunk compensation (displacement of 3D trunk COM). We found that the soft wearable robot increased shoulder elevation/depression ROM, on average, by 6.1±1.7°, for the four participants. Additionally, the robot improved end-effector movement quality and reduced trunk compensation by decreasing hand-path-ratio and trunk displacement, on average, by 50.9±7.7% and 15.3±6.7%, respectively. The demonstrated improvement in movement quality highlights the potential utility of our device for upper limb motor rehabilitation.

Session 3: Clinician Research and Community Engagement–Caregiver Engagement and Education

"Rehabbing the Couple:" Supporting Couples Coping with Stroke through a Novel Dyadic Intervention

Alexandra Terrill, Maija Reblin, Brian Baucom, Beth Cardell, Lorie Richards, Jennifer Majersik
University of Utah, University of Vermont

Nearly 800,000 people in the US experience a stroke each year and many must adjust to living with chronic sequelae, including cognitive, language, and mobility impairments, and mood disturbance. The impact of stroke is shared between the stroke survivor and their romantic partner, as established roles and the ability to connect, participate in shared activities, communicate, and reciprocate may be altered due to impairments. An estimated 30-50% of stroke survivors and their partners experience depressive or anxiety symptoms that negatively affect rehabilitation outcomes and quality of life. Yet interventions to support couples post-stroke are largely insufficient or inaccessible. To address this need, our transdisciplinary team developed an 8-week remotely-delivered dyadic intervention to promote Resilience in Stroke survivor-care partner Dyads (ReStoreD), in which couples learn and practice goal-setting, communication strategies, and positive psychology-based activities like expressing gratitude, finding meaning, and fostering connections. Using a mixed methods design, our pilot study with 34 couples coping with stroke demonstrated feasibility, acceptability, and suggests ReStoreD may reduce depressive symptoms (eta-squared = .22) and increase resilience (eta-squared = .34) in stroke survivors, but not partners. Qualitative interviews indicate that survivors and partners reported the intervention positively impacted communication, meaningful activity engagement, and personal and dyadic coping. These findings are promising, but more research is needed. A national NIH NCMRR R01-funded trial of the intervention is ongoing (current n = 111 dyads of 200 planned).

Self-Compassion-Based Resilience Habits Course for Caregivers of Children with Physical Disabilities

Christine Lathren, Jamie Lynn Tatera, Macy Ratliff, Rosemary Ellsworth, Hannah Allen, Jin Park
University of North Carolina at Chapel Hill, Duke University

Caregivers of children with moderate to severe physical disabilities (e.g., cerebral palsy, spina bifida, traumatic brain injuries, genetic conditions) report high levels of stress, burnout, isolation, and self-blame (Dlamini et al., 2023; Masefield et al., 2020). Self-compassion-based interventions are linked to improved mental health and are suited to address isolation, de-prioritization of self, and self-critical tendencies common to long-term caregivers (Neff, 2023). However, these interventions have not been tested in caregivers of children with physical disabilities. Informed by feedback from service providers, advocates, and a caregiver advisory group, we developed a 6-session (1.5 hour/session) live-online group Resilience Habits for Caregivers course. Eight caregivers (100% female, Mage= 44, 38% Black, 62% White) were recruited via flyers in specialty clinics or community organizations. Caregivers participated in exercises, discussions and practices around 5 key self-compassion-based resilience habits: (1) Mindfulness (noticing thoughts, feelings and sensations); (2) Common Humanity (acknowledging that difficult emotions make sense and connect us); (3) Self-Kindness (providing gentle and strong internal support); (4) Helpful Actions (taking steps to meet needs); and (5) Soaking in the Good (appreciating/noticing good). Online questionnaires were administered pre and post intervention and a group

feedback session was audio recorded, transcribed, and analyzed using reflexive thematic analysis. Attendance and acceptability were high, with 6/8 attending every session and 7/8 strongly agreeing or agreeing that they would recommend the course to other caregivers. Mean resilience and self-compassion increased, while mean anxiety, depression, perceived stress, difficulties with emotion regulation decreased pre versus post intervention. Qualitative themes showed shifts in caregivers' emotional awareness, sense of isolation, and capacity for grace and self-advocacy. Caregivers expressed interest in future co-facilitation by caregiving peers and continued opportunities for involvement. The resilience habits course shows promise as an accessible, acceptable resource for caregivers to gain skills to cultivate greater well-being. Future work should examine efficacy, effectiveness, and implementation.

Trial Ready: Informing a Mobility Intervention Trial for Infants with Down Syndrome

Ashley Collimore, Marie Canty, Izza Choudhry, Anna Donato, Erica Friedman, Marc Maffei, Katherine Pawlowski, Sydney Reynders, Nicole Baumer, Jana Iverson
Boston University, Boston Children's Hospital

Independent mobility is a key driver of infant exploration, communication, and caregiver interactions that support overall development. Infants with Down syndrome (DS) have significant motor delays and have difficulty leveraging mobility for these purposes. Cost-effective, caregiver-implemented interventions that enhance independent mobility are needed to address DS infants' developmental delays. The PUMA body-weight support harness (Enlighten LLC) shows promise in facilitating mobility for infants with motor delays. However, it lacks systematic evidence supporting home-based use, specifically for infants with DS. Our ongoing feasibility study aims to address two critical questions for clinical trial development: (1) Is the PUMA device feasible and desirable for home use for infants with DS? and (2) Which observational and developmental outcome measures are useful for assessing intervention efficacy in the home? To date, eight families (target n = 15), have completed 68 virtual and 30 in-person home data collections. Sessions included infant-caregiver play, capturing observational outcomes (locomotion, object exploration, communication), and standardized developmental assessments. Families also assembled the harness and completed a feasibility survey. Initial feedback indicates all caregivers find the PUMA enjoyable for their infants and foresee its potential to enhance mobility and foster new experiences. Most feel confident in independently using the device at home, with seven willing to commit to at least 30 minutes daily. Ongoing analyses include comparison of virtual and in-person observational outcome measures and monitoring developmental changes over time. The results set the stage for developing the first clinical trial of a home-based mobility intervention tailored for infants with DS.

Session 4: Clinician Research and Community Engagement–Patient Engagement and Education

Game On! CP Soccer Intensive Camp to Promote Self-Efficacy, Positive Attitudes Towards Physical Activity, and Fitness among Children and Adolescents with Cerebral Palsy

Katherine Dimitropoulou, Brian Wishart, Mara Yale, Jacqueline Chen, Hana Azizi
Columbia University, Spaulding Rehabilitation Hospital, Harvard University, Massachusetts General Hospital,

Soccer Inc.

Ambulatory children and adolescents with cerebral palsy (CP-GMFCS I-III) and other early life brain injuries, shy away from physical activity (PA). This mixed methods community based participatory research study examines the feasibility/preliminary effectiveness of the Game On soccer summer camp to improve fitness, attitudes towards PA, and develop social connections among participants. A total of 16 children and adolescents with CP participated. We used heart rate monitors (Polar monitors) to measure fitness before/after and during the camp. We used the Attitudes towards PA Scale, and the Self-efficacy towards PA Scale, before/after the camp. Exit interviews for children (individually) were conducted after camp. The Game On soccer camp (based on the Game On Framework) included an individualized program focused on: a) learning to self -monitor intensity through heart rate using wearable devices and an app; b) peer and near-peer mentorship and team support strategies to improve self-monitoring of fitness, game skills and specific movements important for the game; c) social interactions building reflection through activities organized primarily by campers; d) learning strategies to negotiate personal space conflicts and misunderstandings. The camp was administered for 5 hours/day for 5 consecutive days. Results reveal improved fitness (Cohen's d=0.92 for all participants but mostly those with low PA engagement), self-efficacy and attitude towards PA. Thematic analysis of qualitative data revealed that campers felt: a) confident about their skills; b) empowered to self-monitor their stamina; c) learned movement strategies and new soccer and game skills from peers, and d) developed friendships beyond the camp.

A Novel 'Test-Drive' Strategy for Prosthetic Foot Prescription Using a Robotic Prosthetic Foot Emulator

David Morgenroth, Elizabeth Halsne, Andrew Hansen, Lee Childers, Alexandria Lloyd, Josh Caputo, Brian Hafner
University of Washington, VA Center for Limb Loss and Mobility, University of Minnesota, VA Rehabilitation & Engineering Center for Optimizing Veteran Engagement and Reintegration, Brooke Army Medical Center, Humotech Inc.

Selecting an optimal prosthetic foot is vital to maximizing mobility and achieving functional goals in people with lower limb loss. However, patients do not generally have an opportunity to provide experiential input to the foot selection process. This study aimed to assess an innovative 'test-drive' strategy for foot selection. Sixty-eight individuals with transtibial amputation each trialed three commercial prosthetic feet and three corresponding emulated feet using a robotic foot emulator capable of switching between feet via a software interface during walking on level, inclined, and stair treadmills in the laboratory. Participants then wore each commercial foot for consecutive two-week community trials. All foot conditions were randomized and participant-blinded. Foot preference was measured on a 0-10 scale. Following each community trial, participants also completed self-reported and performance-based measures. Linear mixed-effects regression was used to assess associations between outcomes. Initial foot preference scores from trials with emulated feet correlated with preference scores after community trials with the corresponding commercial feet ($p<.001$) and with Trinity Amputation and Prosthesis Experience Scales–Functional Satisfaction score ($p=.036$), but not with Two Minute Walk Test, Prosthetic Limb Users Survey of Mobility, or Activity-Balance Confidence scores. The most-preferred foot after the after the in-lab trial of the emulated foot matched the most-preferred foot after the community trial of the corresponding commercial foot for 48/68 participants. These results suggest that a patient-centered 'test-drive' strategy using a prosthetic foot emulator could potentially enhance prosthetic foot prescription and lead to improved patient satisfaction outcomes in people with lower limb amputation.

A Transdisciplinary Collaborative Study of mTBI and Chronic Pain Using iTBS and Yoga

Amy Kemp, Bridget Cotner, Bella Etingen, Iboula Kale, Kelly Krese, Sandra Kletzel, Miriam Rafferty, Amy Herrold
Edward Hines, Jr., VA Hospital, Washington State University, Dallas VA Medical Center, UT Southwestern Medical Center, Shirley Ryan AbilityLab

Mild traumatic brain injury (mTBI) with comorbid chronic pain causes significant health challenges, necessitating creative treatment strategies. A transdisciplinary study team comprised of neuropsychologists, yoga instructors, health services researchers and implementation scientists, and physical, occupational, and speech therapists developed and tested a novel nonpharmacological treatment option for chronic pain. Objective: The parent pilot study (clincaltrial.gov #NCT04517604) explored the effects of intermittent theta burst stimulation (iTBS; a type of transcranial magnetic stimulation) to have an additive effect on the neural circuits with yoga on Quality of Life (QoL), function, and pain among Veterans with mTBI and chronic musculoskeletal pain. In the present sub-analysis, we focused on gaining a deeper insight into the QoL results. Methods: Utilizing an open-label trial design, 10 Veterans received iTBS before participating in a TBI-specific yoga program, LoveYourBrain Yoga. The Farmer triangulation method was used to compare qualitative and quantitative outcomes. Outcome measures included self-reported symptom scales and post-participation semi-structured qualitative interviews. Results: Participants reported that iTBS prepared their brains for yoga and increased their confidence in self-management of pain post-participation. This was confirmed with TBI QoL subscales ($t(9)=2.03$; $p=0.02$) and as reported with the participant's self-report. However, TBI QoL composite scores did not agree ($t(9)=-5.17$, $p=0.65$) nor capture the role iTBS + Yoga had on participants' increased confidence in self-management of health and non-pharmacological pain management. Conclusion: Our results suggest integrating advanced neurological technologies with complementary health therapies such as yoga presents a creative, transdisciplinary approach to nonpharmacologic rehabilitation for chronic pain.

Session 5: Clinician Research and Community Engagement– Education

Emphasis on Parent Education and Engagement in Research to Increase Physical Activity Engagement for Ambulatory Children and Adolescents with Cerebral Palsy

Mara Yale, Jacqueline Chen, Brian Wishart, Katherine Dimitropoulou
Massachusetts General Hospital, Soccer Inc., Spaulding Rehabilitation Hospital, Harvard University, Columbia University

Existing studies of parents with children and adolescents with cerebral palsy, or other brain injuries early in life, focus on parents' perspectives about physical activity (PA) as well as barriers and facilitators that may hinder or support their children's participation. Less is known about parents' potential needs to better understand their children's PA needs, abilities, and potential. This project is part of the Game On Sports Multidimensional Framework that emphasizes parents' active engagement, education, and participation in developing and supporting PA for children and adolescents with CP. We use a community based participatory research design and provide perspectives of parents as research partners, research consultants, and research participants. We

provide an example of a parent group (N=16), whose children attended a 5 day (5 hrs/day) Game On Summer Soccer Camp. During camp, we facilitated one session for parents to connect, share their origin stories, and appreciation for what they'd witnessed in their children at camp and outside of camp during the week. We present qualitative data from that group activity and from individual parents' interviews after their children completed the camp. Thematic analysis of the post camp individual interviews reveals that parents highly value: a) personnel responsiveness (i.e. coaches and camp leaders) to campers' abilities (not deficits); b) positive social interactions that PA engagement can provide for their children; c) the opportunity for their children to develop personal interests related to their bodies and self-monitor their goals; and d) the development of social relationship that are beyond the PA events.

Rehabilitation & Engineering Center for Optimizing Veteran Engagement & Reintegration (RECOVER): Transdisciplinary Collaborations to Drive Change in Participation in Veterans

Tonya Rich, Sara Koehler-McNicholas, John Looft, Erin Krebs, Andrew Hansen
Minneapolis VA Health Care System, University of Minnesota

The Rehabilitation & Engineering Center for Optimizing Veteran Engagement & Reintegration (RECOVER) is a newly funded VA Rehabilitation Research & Development Center where our mission is to maximize Veteran participation in important lifelong roles and activities through development, evaluation, and clinical translation of practical rehabilitation interventions and technologies. This work is being conducted in Veterans with amputation or spinal cord injuries and disorders. Our team consists of transdisciplinary rehabilitation researchers and Minneapolis VA clinicians, allowing for the unique conceptualization of participation and clinically relevant approaches to our projects. Our team conducts research into the barriers and facilitators of participation in our studied populations. Our studies are now being designed for longitudinal follow up of participation outcomes. The team uses our research to inform the design of new rehabilitation interventions. Identifying barriers/promoters of participation, paired with a user-centered approach, guides medical device innovation where we seek stakeholder input (e.g., end user, clinicians, and industry partners) at all phases of device development. Using this approach, we have licensed 6 technologies to industry partners supporting Veteran needs for innovation in skin care, novel prosthesis components, and prosthesis management. Within RECOVER, we now have a Veteran & Caregiver Engagement Panel for additional stakeholder feedback throughout the research process. Finally, RECOVER supports future VA rehabilitation researchers through mentorship and training. Taken together, the work of RECOVER is intended to advance our understanding and interventions to support participation in desired activities and roles for Veterans with disabilities and contribute to the field of rehabilitation research.

Walking Exercise Sustainability through Telehealth for Veterans with Lower-Limb Amputation

Rachael Akay, Brecca Gaffney, Ryan Stephenson, Elizabeth Juarez-Colunga, Paul Cook, Cory Christiansen
VA Eastern Colorado Healthcare System, University of Colorado

BACKGROUND The VA Durability of Rehabilitation Interventions for Veterans (DRIVE) funding mechanism supports novel, multimodal rehabilitation approaches, including clinician-directed interventions and Veteran

self-managed components, to improve long-term durability of rehabilitation outcomes. This trial funded by the DRIVE mechanism focuses on sustained walking exercise after lower-limb amputation. While conventional lower-limb amputation rehabilitation effectively improves functional capacity, healthy levels of walking are not sustained post-rehabilitation. OBJECTIVE The "Walking Exercise Sustainability Training (WEST)" trial examines a Veteran home-based self-maintenance intervention after lower-limb loss. The WEST trial, designed by a transdisciplinary team of patients, physical therapists, occupational therapists, physicians, psychologists, nurses, and bioengineers, is a psychologically informed approach based on behavioral frameworks and patient-centered communication. Wearable sensors and peer support are used in a telehealth environment to deliver the intervention with the aim of sustaining walking exercise. METHODS WEST is a randomized controlled superiority trial that tests an 18-month telehealth walking exercise self-management program. Veteran participants will complete six one-on-one intervention sessions, and six peer-support group sessions. The experimental arm will receive a self-management program focused on sustaining walking exercise and the control group will receive attention-control health education. Daily walking step count (primary outcome; actigraphy) will be continuously monitored during study participation. Secondary outcomes assess potential translation of the WEST intervention into conventional VA amputation care. IMPACT The unique rehabilitation paradigm in this trial addresses the problem of persistent sedentary lifestyles following lower-limb amputation through a telehealth self-management model. The novel transdisciplinary strategy will inform implementation potential, including a signal for clinical effectiveness.

Day 2 Abstracts

Keynote Presentation: Michael Boninger, Ph.D.

Building Innovative, Lasting, Interprofessional Teams: What I Have Learned from Others

Michael Boninger
University of Pittsburgh

The talk will focus on the core elements of building innovative, lasting, interprofessional teams. It will not only reflect my own experiences, but draw on the invaluable lessons learned from my colleagues in rehabilitation research. In addition to insights on team building, the talk will showcase key findings of my colleagues; key findings that were make possible because of their ability to lead and work as a part of team.

Session 6: Augmented Therapy–Rehabilitation Technology

Cross-disciplinary study of the neural basis of rehabilitation outcomes with virtual reality: a preliminary investigation

Neha Mehta, Rory O'Keeffe, Yair Shahar, Sarmad Mehrdad, Farokh Atashzar, Anat Lubetzky
New York University

Virtual Reality (VR) is increasingly gaining traction as an innovative solution to enhance rehabilitation outcomes by providing a conducive environment for engaging and customizable physical activity. To harness the benefits of such technologies, it is imperative to understand their interaction at the neural level. Therefore, as a first step, we utilized Electroencephalography (EEG) to investigate the spatiotemporal dynamics of the brain in young adults with and without VR immersion. Five healthy young adults (4 males) performed boxing exercises guided by either a 3D VR-based game or an instructional video displayed on a 2D computer screen. A 64-channel EEG was recorded during 3 graded task intensity levels: (i) rest, (ii) moderate, and (iii) advanced. We calculated the mean power spectral density in the 20-100 Hz range as a proxy to the level of activation for each EEG channel. Median cortical activation in each pre-frontal, frontal, parietal, and occipital region increased in proportion to task intensity, both with and without VR. The overall cortical activation was higher with VR versus instructional video for advanced-intensity tasks ($p<0.001$). Higher cortical activation indicates an underlying ion flow gradient for synaptic transmission, suggesting some neuroplastic changes during VR immersion. In this presentation, we will cover the implications of emerging results from the ongoing pilot randomized crossover study. We will discuss the rational for methodologies that combine VR headsets and EEG and our choice of outcome measures. This line of research holds significant potential to explain the effectiveness of VR and facilitate rehabilitation research and clinical translation.

The WeeBot: Development of a Unique Powered Mobility Device for Very Young Infants through Transdisciplinary Collaboration

Sharon Stansfield, Carole Dennis
Ithaca College

In this presentation we will discuss the transdisciplinary research approach used to develop a powered mobility device for infants and why collaborations between technologist and clinicians should start early, and on the clinical side. The WeeBot is a powered mobility device shown to provide independent, hands-free, and self-directed movement to infants as young as 6 months old. The control method is innovative: The device moves in the direction that the child leans, making it a more intuitive device than anything currently available. Additional safety features reduce the risks inherent in providing powered mobility to infants this young. The origin of the WeeBot as a research project began with a collaboration between a pediatric Occupational Therapist whose experience in early intervention provided the unsolved problem Roboticist with an interest in solving real world problems. Providing mobility is now viewed as a beneficial aspect of therapy, but the general approach is "movement for movements sake". The WeeBot team which had added a Pediatric Physical Therapist and Development Psychologist, believed that movement with purpose was the key to gains in future milestones. Current technologies struggle to provide this -- most infants can't fully control devices that use joysticks/switches. The technologist understanding the problem but not bound by disciplinary history, could provide a unique perspective on the a solution and hence the WeeBot came to be. A start-up company, Assistance in Motion, founded by the core of the research team is now working to commercialize and make this device available to clinicians and parents.

Learning to Explore and Exploring to Learn: Understanding Powered Mobility Use in Toddlers with Disabilities

Kimberly Ingraham, Heather Feldner, Katherine Steele
University of Washington

For toddlers with disabilities, powered mobility technology can be a powerful tool to facilitate self-initiated exploration and social engagement in home, community, and clinical environments. However, despite overwhelming evidence that access to independent mobility is critical for early development, access to powered mobility for toddlers with disabilities is significantly limited. New devices, such as the Permobil Explorer Mini, have recently made it easier and safer to provide powered mobility options for young children with disabilities at appropriate developmental stages. Yet, many open questions remain surrounding how toddlers learn to use these devices, how powered mobility can support development, and how we should design powered mobility interventions. Our transdisciplinary team of engineers, clinician scientists, and rehabilitation professionals has investigated how toddlers with disabilities use powered mobility for self-directed play and rehabilitation across a spectrum of environments: in the lab, at home, and in the clinic. We will discuss quantitative and qualitative results from our recent Explorer Mini experiments with over 35 children with diverse developmental disabilities, including device use patterns, developmental outcomes, and the perceptions of caregivers and rehabilitation professionals. We found that after 16 weeks of using powered mobility at home, there were significant improvements in the Bayley IV across all domains. In the lab, we demonstrated that on average, kids move a distance of 52 meters in a 15-minute play session. These results support our long-term goal of building the scientific foundation needed to foster the translation of clinically impactful mobility technologies for infants and toddlers with disabilities.

Session 7: Transdisciplinary Rehabilitation

Advancing Hospital Acquired Pressure Injury Prevention with a Data-Driven Transdisciplinary Model

Bridget Fowler King, Colleen Johnson, Matthew Grissom, Andrew Morris, Miriam Rafferty
Shirley Ryan AbilityLab

Introduction: Our project aims to reduce HAPI occurrences in spinal cord injury patients by translating risk identification research into effective quality improvement strategies. Objective: To develop and implement a "Pressure Injury Prevention Toolkit," enhanced by a HAPI reporting dashboard, to improve risk-based clinical decision-making and define clear roles for healthcare providers. Methods: Using an 18-month Plan, Do, Study, Act (PDSA) cycle, we introduced new nursing workflows for identifying high-risk patients, real-time data visualization for HAPI metrics, and regular transdisciplinary meetings to refine patient care plans and interventions. Results: The initial PDSA cycle highlighted areas for protocol refinement, such as increasing buy-in from floor managers and creating sustainable, adaptable work processes. Future cycles will focus on improving dashboard engagement, prevention compliance, and transdisciplinary discussion fidelity. Implications: This approach integrates digital tools and transdisciplinary insights to revamp traditional HAPI prevention strategies, paving the way for broader implementation across the hospital. Conclusion: Our project demonstrates the transformative potential of technology-enhanced, transdisciplinary strategies in improving patient care quality and reducing HAPI rates.

A Novel Cluster Analysis Scheme for Determining Levels of Upper Extremity Functional Capacity in People with Chronic Stroke

Akhil Mohan, Yanjun Wu, Ryan Chatterjee, Steven Wang, Kyle O'Laughlin, Xin Li, Ken Uchino, Xiaofeng Wang, Ela Plow
Cleveland Clinic, Case Western Reserve University, Solon High School

Introduction: Outcomes or assessments in stroke are typically performed in silos of measuring impairment or dexterity. Recently, Woodbury et al. have developed a functional capacity measure that seeks to combine different types of assessments (Upper Extremity Fugl-Meyer, UEFM-impairment measure and Wolf Motor Function Test, WMFT-functional ability measure) to provide a comprehensive understanding of stroke patients' functional status. However, how functional capacity varies across different severity ranges in stroke has never been identified to build targeted upper extremity (UE) therapies. With this goal, our rehabilitation group, paired with statistical modeling experts, developed a classification scheme for the first time to define cut-off scores that differentiate levels of UE functional capacity in people with chronic stroke. Methods: We performed cluster analysis of the UEFM+WMFT short form to identify groups of participants with similar levels of functional capacity (Range: 0-57). We further evaluated the consistency of the clusters through Silhouette analysis. Results: We pooled seventy-one stroke survivors' baseline data from three funded interventional studies. Participants had a mean (standard deviation, SD) age of 63.6 (SD 10.4), UEFM Score of 30.1 (SD 17.5), and WMFT Functional Ability Score of 36.8 (SD 21.1). Results from our cluster analysis support a three-group classification scheme of UE functional capacity: 0-26 (Low), 27-41 (Moderate), and 42-57 (High). The average silhouette width

was 0.6, indicating reasonable consistency of clusters. Conclusion: Severity-specific functional capacity characterized using our classifier scheme can facilitate the design of targeted UE rehabilitation interventions for people with chronic stroke.

Transdisciplinary Approaches for Preserving Shoulder Health in Children and Adults with Spinal Cord Injury/Dysfunction

Brooke Slavens, Amee Seitz, Carrie Peterson, Kathy Zebracki, Alyssa Schnorenberg, Karin Goodfriend, Chris White, Sergey Tarima, Jonathan Samet, Mark England, Shubhra Mukherjee, Lawrence Vogel
University of Wisconsin-Milwaukee, Northwestern University, Virginia Commonwealth University, Shriners Children's Chicago, Medical College of Wisconsin, Ann & Robert H. Lurie Children's Hospital of Chicago

Manual wheelchair mobility places high demands on the upper extremity, often leading to shoulder pain and injuries. Despite existing clinical practice guidelines for upper limb preservation following spinal cord injury/dysfunction (SCI/D), most still experience shoulder pain. These guidelines are applied to children with SCI/D without sufficient evidence of effectiveness over their lifespan. Individuals with pediatric-onset SCI/D live longer with secondary health conditions than those with adult-onset SCI, making it crucial to understand the relationship between shoulder function, pain, and pathology across ages. We are therefore investigating the relationship between pediatric-onset and adult-onset SCI/D manual wheelchair propulsion and their association with shoulder pain and pathology. Together our team is exploring innovative, transdisciplinary strategies to enhance shoulder health and function, leveraging insights from engineering, physiatry, radiology, behavioral science, and data analytics. We are working together to conduct a mixed-methods study integrating quantitative assessments of shoulder function and rotator cuff integrity, and qualitative insights from individuals with SCI/D. Our team is also determining the effects of age at onset and movement variability on rotator cuff and bony forces using personalized musculoskeletal simulations. Results suggest age of onset significantly affects shoulder dynamics and tendon integrity with decreased variability linked to increased shoulder pain and pathology. These findings will ultimately be used to develop age-appropriate rehabilitation guidelines, improving functional independence, participation, and quality of life for individuals with SCI/D. Our transdisciplinary approach is crucial for solving the multifactorial issue of alleviating shoulder dysfunction in manual wheelchair users across the lifespan to develop lasting rehabilitation impacts.

Session 8: Augmented Therapy–Telehealth and Wearables

Motor Skill Learning in School-Age Children Tested with a Gamified Mobile Health System

Md Raihan Mia, Cassandra Kemmel-Bartletti, Sheikh Iqbal Ahamed, Samuel Nemanich
Marquette University

Motor skills are critical to a child's physical development, academic success, and social participation. Evidence of motor skill learning requires multiple evaluations across time, posing challenges for traditional laboratory testing. Combining expertise of two labs in rehabilitation and computer science, we implemented a motor learning task within a mobile health iPad application to study unimanual and bimanual skill learning in a school environment. Twenty-five participants ages 5-8 were tested as part of an on-going study investigating

differences in motor skill learning between children born preterm or at term age. Testing occurred on three separate days (Day 1, Day 2, Day 7) wherein participants performed 5 blocks (24 trials/block) of a unimanual and bimanual task using a wireless gaming remote fitted with joystick handles. The game objective was to move a visual cursor (ladybug) to a target (flower). Completion time and movement error were calculated and used to evaluate 7-day retention; comparisons were made between tasks (bimanual vs. unimanual) and age (5-6 y/o vs. 7-8 y/o). A greater proportion of 7-8 y/o children (80%) showed retention compared to 5-6 y/o children (33%) for both tasks, however, there were overall fewer children who showed retention of bimanual (19%) compared to unimanual (31%) skills. Movement errors significantly decreased at Day 7 for unimanual compared to bimanual skills ($t = -3.134$, $p = 0.007$) demonstrating better unimanual skill retention. Mobile devices may enable precise and objective data collection outside the laboratory, enabling future motor learning research in children with and without developmental disorders.

Implementation of Remote Therapeutic Monitoring into Physical Therapy at a Large Academic Healthcare System

Kevin McLaughlin
Johns Hopkins University

Remote therapeutic monitoring (RTM) is an mHealth solution that allows physical therapists to communicate with patients who have musculoskeletal conditions and track their progress outside of clinic visits using a mobile application. By enhancing patients' engagement with their care, RTM stands to increase the effectiveness of physical therapy care for patients with musculoskeletal conditions. At the same time, RTM is very different than traditional physical therapy services as it is delivered through a mobile application outside of scheduled clinical visits. The procedural codes used to cover RTM services are also new, having been announced in 2022 by the Centers for Medicare and Medicaid Services. As such, best practice approaches for implementing RTM into clinical practice have not been established. Since early 2024, our team has been actively implementing a mobile application and RTM workflows across a large outpatient rehabilitation network. In this presentation, our team will describe our experiences implementing RTM services across our network. Guided by the RE-AIM framework, we will report on patient acceptance and utilization of these services, as well as provider uptake of RTM and utilization rates. We will also provide preliminary estimates regarding the influence of RTM on patient-reported outcomes, which are routinely collected at our institution. Lastly, we will discuss challenges we have experiences during implementation and recommendations for other institutions interested in implementing RTM services.

Building Context-Aware Digital Health Tools: A Framework for Evaluating Real-World Human Health and Behavior

Christopher DiCesare, Scott McLean
Exponent, Inc.

Digital health tools that utilize innovative technologies (wearable / portable devices, human-centric artificial intelligence / machine learning [AI / ML], etc.) have enormous potential for targeted human performance monitoring, pain, disease, and/or disability management. Efforts in this space have, for the most part, yet to translate into clinically useful applications. For every potential opportunity that these tools present, challenges persist, including how to devise experimental protocols in unconstrained, real-world settings to ensure that

meaningful data is captured, how to make sense of those data / reconcile with what we observe in the laboratory, and how best to integrate these insights within the clinical ecosystem. In this presentation, I discuss the generalized framework our team (EPIC Laboratory) has been developing that supports proactive planning for, anticipation of, and adaptation to real-world human behavior, with a specific emphasis on the principles of human movement and cognitive science, contextual design, and user experience evaluation as applied to engineering design and product development.

Enhancing Accessibility and Precision in Multiple Sclerosis Rehabilitation: A Transdisciplinary Approach to Digital Health Solutions

T. Bradley Willingham, George Collier, Jacob Cartwright, Deborah Backus
Shepherd Center

Rehabilitation and exercise can have a profound impact on health, function, and quality of life in people living with multiple sclerosis (MS). However, people with MS often experience physical, psychosocial, environmental, and economic barriers that limit their ability to participate in rehabilitation programs. These barriers often result in significant health disparities, underscoring the urgent need for accessible and effective strategies that promote sustained participation in health-enhancing physical activities for people with MS. Advancements in digital health technologies, such as internet-based tele-rehabilitation platforms and wearable sensors, offer promising solutions to address health inequities and expand access to rehabilitation programs. Yet, the translation of digital health tools into clinical practice is often impeded by challenges in data integration, the extraction of actionable insights, and the effective dissemination of critical information to both clinicians and patients. To address these issues, we have assembled a transdisciplinary team comprising clinical research scientists, engineers, data scientists, and clinicians to bridge the gap between technological innovation and practical application in rehabilitation care. Through a rigorous co-innovation approach, our team has developed a novel digital health solution that automatically captures and integrates multicomponent health information from state-of-the-art remote monitoring technologies to deliver a comprehensive approach to managing remote treatment strategies. Additionally, we demonstrate how intelligent analytics and user-friendly dashboards can be leveraged to rapidly deliver actionable insights to clinicians and patients. This initiative not only democratizes access to evidence-based care for individuals with chronic conditions but also opens new avenues for scientific inquiry into the daily, lived experiences of people with MS.

Session 9: Provider Experience

Predicting Device Implementation Potential: Development and Validation of a Tool Based on the DART Framework

Amy Kemp, Courtney Celian, Andrew Berry, Hannah Reed, Kevin Smaller, Miriam Rafferty
Washington State University, Shirley Ryan AbilityLab, Northwestern University

Introduction: The Design for AcceleRated Translation (DART) framework identifies factors that impact translation speed. This study outlines the development and validation of the DART for Rehabilitation Technologies (DART-RT). We hypothesized a survey-based tool could predict the readiness for implementation of a device based on end-user evaluations on seven determinants: cost, safety, effectiveness, clinical demand, patient values, relative

advantage, and clinical utility. Methods: DART-RT was developed through three phases: 1) item development, 2) scale development, and 3) scale evaluation. In Phase 1, content experts generated and reviewed items and descriptions of neurorehabilitation technologies. Phase 2 included cognitive interviews with end users (i.e., rehabilitation clinicians, providers, patients, and engineers). The survey was then pilot-tested with end users. Phase 3 included exploratory factor analysis, model fit, reliability, and validity. Results: Phase 1 resulted in 12 descriptions of neurorehabilitation tools and seven constructs as defined by the DART framework. Phase 2 iteratively interviewed six end users to assess the questions' appropriateness and the responses' strength. The pilot data included 104 responses. Preliminary factor analysis and model fit indicate results load into two factors (< 0.4) determined to be F1: Viability (cost, safety, effectiveness) and F2: Implementation potential (clinical demand, patient values, relative advantage, and clinical utility). Preliminary model fit was adequate (CFI: 0.969, SRMR: 0.064, RMSEA: 0.054). Conclusions: DART-RT addresses the complexity of describing implementation potential. Understanding implementation potential profiles can inform whether a technology is ready for clinical implementation, requires further refinement, or lacks viability.

Provider Experiences with Integrative Medical Group Visits for Chronic Pain

Mary Jackson, Paula Gardiner, Jennifer Leeman, Isabel Roth
University of North Carolina at Chapel Hill, Cambridge Health Alliance

Purpose: The well-being of healthcare teams is an important consideration when seeking to improve patient experience and quality of care. Prior studies have found that changes to working conditions are most effective to improve provider well-being. Integrative Medical Group Visits (IMGVs) modify working conditions in ways that may impact provider well-being. However, little is known about healthcare teams' experience with the implementation and maintenance of IMGVs in clinical settings. Method: Interviews were conducted via Zoom and telephone with 21 clinicians, administrators, and staff from safety-net healthcare settings throughout the country who have implemented IMGVs for patients with chronic pain. To be considered an IMGV, patients received care concurrently by a licensed clinician who documented the visit, patients interacted, and clinicians provided integrative healthcare in the form of mind-body practice. Interviews included questions about provider experience, well-being, and satisfaction with the IMGV model. Interviews were recorded, transcribed, and coded using thematic content analysis by a team of trained qualitative researchers. Results: The authors identified four themes describing how IMGV positively affected provider well-being: horizontal power dynamic, collaboration with an interprofessional team, guideline-concordant care, and enhanced meaning and purpose. An additional fifth theme identified organizational supports that directly impact provider well-being during IMGV delivery. Conclusion: The current study was the first to use interviews from healthcare teams who have implemented IMGV to assess their experience and understand the effect on well-being. The themes identified warrant further investigation into IMGVs as a strategy to promote provider well-being and mitigate aspects of burnout.

Abstract Author Index

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MR3 Network 2024 Scientific Retreat Planning Committee

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