

REHABILITATION RESEARCH AT NIH MOVING THE FIELD FORWARD

MAY 25-26, 2016
NATIONAL
INSTITUTES
OF HEALTH
BETHESDA, MD

NATCHER CONFERENCE CENTER
MAY 25–26, 2016

CONFERENCE AGENDA

DAY ONE:

Wednesday, May 25, 2016

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| 8:00 a.m. | REGISTRATION |
| 8:30–8:45 a.m. | Welcome: Plan for Conference
Catherine Spong, M.D.
<i>Director, Eunice Kennedy Shriver National Institute of Child Health and Human Development</i> |
| 8:45–9:00 a.m. | Relevance and Importance of Rehabilitation to NIH and Introduction of Keynote
Francis Collins, M.D., Ph.D.
<i>Director, National Institutes of Health</i> |
| 9:00–10:00 a.m. | Consumer Keynote
Same Sky Project |
| 10:00–10:30 a.m. | Break and Poster Session |
| 10:30–11:30 a.m. | Rehabilitation Across the Lifespan
<i>Toward Integrated Models of Rehabilitation</i> |

Moderator: Alan Jette, Ph.D., *Boston University*

Panelists: Andrea Cheville, M.D., *Mayo Clinic*; Jonathan Bean, M.D., MPH, *Harvard Medical School*; Shari Wade, Ph.D., *Cincinnati Children's Hospital Medical Center*

The theme of this session is moving rehabilitation interventions from a traditional “one-and-done” isolated model of care to one where rehabilitation interventions are integrated into the mainstream of health care for various populations. Dr. Cheville will discuss barriers to integrating function-directed care into the comprehensive management of progressive diseases, particularly those with a heavy treatment burden. Cancer will be used as an exemplar to emphasize the simultaneously dynamic and insidious nature of disablement in chronic illness. Collaborative care approaches, including telecare, that are validated for pain and depression management will be described as a promising means to address

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cancer-related disability in a proactive and patient-centric way. Dr. Bean will focus on limitations with mobility tasks, such as walking, rising from a chair, or climbing stairs, as a signal condition identifying older adult primary care patients at an increased risk for disability, morbidity, and death. He will discuss how rehabilitative care can play a critical role with older adult primary care patients by developing integrated care paradigms between primary and rehabilitative care providers focused on prevention of mobility decline among older adults. Dr. Wade will talk about the need to integrate pediatric rehabilitation into the broader framework of child development, with an awareness that each developmental phase may reveal emerging deficits or barriers to optimal functioning and participation. She will discuss family problem-solving treatment as an integrative, technology-based approach to address behavioral and social problems and promote optimal functioning. Each speaker will introduce pressing research questions that remain to be addressed within this overall theme.

11:30 a.m. – 12:30 p.m. Technology in Rehabilitation
From Cutaneous to Implanted: Innovations Driving Development
Examples from Cochlear Implants, Functional Electrical Stimulation,
Brain Computer Interface, and Prosthetics

Moderator: Ranu Jung, Ph.D., *Florida International University*

Panelists: Leigh Hochberg, M.D., Ph.D., *Harvard University*; Reggie Edgerton, Ph.D., *University of California, Los Angeles*; Joseph Rizzo, M.D., *Harvard University*; Mario Svirsky, Ph.D., *New York University*

Innovation and advances in engineering and computing are having a ubiquitous impact on health and well-being. In this session we will briefly review the role of technology in scientific discovery, recovery and restoration of missing or lost function. Panelists will use examples from engineering of cochlear and visual prosthetic devices and brain and spinal cord interfaces, to discuss challenges and opportunities for developing technologies that interface with the nervous system at an appropriate level, are user-centric and responsive to the ability of the user and their life-span, and could provide new neuroscience insights to inform neurorehabilitation science. They will also discuss the importance of having appropriate assessment methodologies and comprehensive engagement with regulatory, industry and clinical partners.

12:30–1:30 p.m. LUNCH

1:30-2:30 p.m. Mechanisms and Markers of Activity and Function
Exercise, Plasticity, and Mechanism: How Is Rehabilitation Happening?

Moderator: Keith Tansey, M.D., Ph.D., *Methodist Rehabilitation Center*

Panelists: Rick Lieber, Ph.D., *Rehabilitation Institute of Chicago*; Stephen Seliger, M.D., *University of Maryland*; James Blumenthal, Ph.D., *Duke University*

Rehabilitation interventions are applied to patient populations with diverse physiological profiles over extended periods of time, with relatively little evidence regarding how which interventions are doing what in whom. The focus of this session is to discuss current understanding, but also gaps and opportunities, regarding our desire to better understand mechanistically what we are doing in rehabilitation. The speakers will address aspects of injury and rehabilitation in the nervous, muscular, renal, and cardiac systems. Dr. Tansey will address a need for better profiling of human subjects in restorative neurology studies so as to better retrospectively analyze responders versus nonresponders. He will also discuss the need for monitoring tools to ensure that rehabilitation interventions are proceeding toward more normal physiology. Finally, he will address how neurological plasticity after injury can be both adaptive and maladaptive and how we will need to work to gain the former while limiting the latter. Dr. Lieber will then address skeletal muscle plasticity in injury and rehabilitation, discussing the shortcomings of classic measures that rarely capture the functionally relevant properties of skeletal muscle. He will discuss how most plasticity studies focus on muscle active properties such as force generation and fatigue and less so on problems involving passive mechanical properties due to contracture or fibrosis. Lastly, he will discuss new areas of investigation in the field including extracellular matrix structure and function and the need for new imaging methods that would permit meso-scale quantitative measures of muscle performance that are objective and

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clinically relevant. Then Dr. Seliger will address chronic kidney disease and its impact on neurocognitive function, physical performance, and aerobic capacity in older adults. The mechanisms which relate kidney disease to physical and cognitive impairment will be discussed and the implications for successful rehabilitation of these patients will be examined. Dr. Seliger will then discuss the effects of exercise training on improving neurocognitive function and protecting against cognitive decline in renal disease patients. The session will conclude with Dr. Blumenthal's presentation on the added value of stress management in cardiac rehabilitation. He will describe the results of the recent ENHANCED trial, examining the effects of stress management training combined with standard exercise-based cardiac rehabilitation on stress levels, coronary heart disease biomarkers, and clinical outcomes. He will discuss the importance of disseminating these findings and how we can develop ways to make cardiac rehabilitation, and stress management, more accessible to patients with coronary heart disease.

2:30-3:30 p.m.

Individuals, Families, and Community

Incorporating the Home, the Family, and the Community in the Rehabilitation Intervention

Moderator: Linda Ehrlich-Jones, Ph.D., *Rehabilitation Institute of Chicago*

Panelists: Christopher Murtaugh, Ph.D., *Visiting Nurse Service of New York*; George Alexopoulos, M.D., *Cornell University*; Sara Czaja, Ph.D., *University of Miami Miller School of Medicine*

Rehabilitation interventions incorporating the home, the family and the community focuses on active engagement of patients, family and community members to achieve increased quality of life for people with disabilities. The end goal is greater independence and providing opportunities for people with disabilities to actively contribute to their community. This session will focus on strategies to help individuals better understand and manage disability and achieve or maintain positive quality of life and independence, as well as examine the impact of challenges experienced by caregivers of individuals with disabilities. Dr. George Alexopoulos will discuss psychosocial interventions aimed at reducing post-stroke depression and stress. These interventions rely on five integrated components: (1) offer patients action-oriented, "new perspective" about recovery; (2) provide an "adherence enhancement structure"; (3) offer a "problem solving structure" to the patient focusing on problems, valued by the patient, and pertinent to daily function; (4) help the patient's family "reengineer its goals, involvement, and plans" to accommodate the patient's disability; and (5) "coordinate care with specialized therapists" with the goal to increase patient participation in rehabilitation and social activities. Dr. Christopher Murtaugh will describe research at the Visiting Nurse Service of New York designed to improve the outcomes of patients receiving physical therapy at home. The study populations include persons with (1) activity-limiting pain; (2) total hip or knee replacements; and (3) implantable cardiac devices. The research projects range from feasibility and pilot studies of new care models to a randomized clinical trial of the comparative effectiveness of two evidence-based treatments. Results from these studies will be briefly summarized and their implications for the NIH Rehabilitation Research Plan will be discussed. Dr. Sara Czaja will discuss the critical role that family caregivers play in supporting older adults and family members with a chronic disease or disability. She will highlight the types of tasks that caregivers perform and the potential impact of caregiving on the caregiver. Dr. Czaja will also discuss intervention strategies that are aimed at supporting family caregivers and reducing caregiver burden with an emphasis on technology-based interventions. Gaps and opportunities for future research include examination of the impact of sociodemographic influences, including geography, socioeconomic status, education, and culture on rehabilitation success. In addition, development of self-management strategies that can be implemented in community settings to help individuals better understand and manage their disability and achieve or maintain positive quality of life and independence will be discussed.

3:30-4:00 p.m.

BREAK AND POSTER SESSION

4:00 p.m. – 5:00 p.m.

Access to the Lived Environment

Low-Cost, In-Home, or Open-Source Solutions: Opportunities and Challenges

Moderator: Melanie Fried-Oken, Ph.D., *Oregon Health & Science University*

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Panelists: Cole Galloway, Ph.D., *University of Delaware*; Maureen Schmitter-Edgecombe, Ph.D., *Washington State University*; James Coughlan, Ph.D., *Smith-Kettlewell Eye Research Institute*

This collaborative session will address low-cost, in-home, and open-source assistive technologies that are developed, through NIH funding, for individuals across the lifespan with a range of disabilities. First, panelists will present their individual research programs, identifying how assistive technologies support social mobility with GoBabyGo, functional independence with smart environment technology, and vision impairment with mobile technology. In a discussion format, the rehabilitation scientists will then consider the opportunities and challenges posed by introducing assistive technologies into daily environments to increase participation. Three topics will be addressed: Incorporating participatory action research into rehabilitation science; demonstrating the utility of technologies for value added to users and professionals; and scaling technologies, in terms of sustainability and reaching individuals over time. Conference participants are invited to submit probes in advance of the meeting that will be answered by the panelists, as well. Your questions should address the development, use and measurement of assistive technologies for functional outcomes.

5:00 p.m.

Closing Remarks

Walter Koroshetz, M.D.

Director, National Institute of Neurological Disorders and Stroke

5:15–6:30 p.m.

Networking for New and Young Investigators

DAY TWO:
Thursday, May 26, 2016

8:30–9:00 a.m. REGISTRATION

9:00–9:15 a.m. Welcome
Jill Heemskerk, Ph.D.
Acting Deputy Director, National Institute of Biomedical Imaging and Bioengineering

9:15–9:45 a.m. Development of an NIH Rehabilitation Research Plan
Trans-NIH Medical Rehabilitation Research Committee

Alison Cernich, Ph.D., ABPP-CN
National Center for Medical Rehabilitation Research

Lyn Jakeman, Ph.D.
Program Director, National Institute of Neurological Disorders and Stroke

The Trans-NIH Medical Rehabilitation Research Coordinating Committee will describe the development of the Rehabilitation Research Plan, the feedback received from the community through the request for information issued in 2015, and the subsequent revisions to the document that resulted from the input gathered. This presentation will include a brief discussion of the metrics that will be used to monitor progress and methods by which progress on the plan will be shared with the community.

9:45–10:00 a.m. BREAK AND MOVE TO PARALLEL SESSIONS

10:00 a.m.–12:00 p.m. Understanding the Context: Environmental Impacts in Rehabilitation
Room F1/F2

Moderator: Michael Mueller, Ph.D., *Washington University*

Panelists: Amanda Botticello, Ph.D., M.P.H., *Kessler Foundation*; Patrick Kitzman, Ph.D., *University of Kentucky*; James Burke, M.D., *University of Michigan*

“Environment” is an important, modifiable, and understudied element in the International Classification of Functioning, Disability and Health (ICF) framework. The overarching theme of this session is to highlight currently funded projects related to a broad spectrum of Environmental issues and to challenge the participants to identify other understudied and significant areas of Environment related to the rehabilitation process. Dr. Burke will provide a conceptual model of the ways in which race and socioeconomic factors may interact with contextual factors such as caregiver support, transportation, neighborhood environment and social network to limit access to rehabilitation. This portion will focus on modifiable drivers of racial differences in post-stroke disability and will consider stroke survivor and family level strategies to reduce disability and decrease disparities. Moving from a conceptual framework to a policy perspective, Dr. Botticello will consider links between community context and long term outcomes for persons with spinal cord injury (SCI). Community characteristics such as socioeconomic disadvantage, resource deprivation, segregation, and physical inaccessibility are likely to threaten the physical, psychological, and social functioning gains achieved during rehabilitation.

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This presentation and discussion will explore the community-level factors that increase the risk for disability and health problems following SCI with applications to other populations seen in rehabilitation. And finally, Dr. Kitzman will report on an applied perspective from the field on rehabilitation within the context of rural communities. The presentation and subsequent discussion will focus on the supports and barriers to long-term health and healthcare for individuals with neurological conditions (stroke, brain injury, spinal cord injury, etc.), living in rural communities to provide the overall context needed to conduct or translate rehabilitation research and findings in these challenging, often underserved communities. Substantial time will be devoted to a panel discussion exploring and identifying key areas where NIH should direct future resources and opportunities to understand better how rehabilitation outcomes can be influenced by specific environmental factors.

10:00 a.m.–12:00 p.m. Effective Pathways to Evidence for Rehabilitation
Room E1/E2

Moderator: James Malec, Ph.D., *Rehabilitation Hospital of Indiana*
Panelists: Lynn Snyder-Mackler, P.T., Sc.D., S.C.S., F.A.P.T.A., *University of Delaware*; Catherine Lang, Ph.D., *Washington University*; Susan Horn, Ph.D., *University of Utah*

This symposium will examine phases, options, and challenges to advancing a line of rehabilitation research. Significant challenges and solutions in incorporating mechanisms, dosing, and examining standard care through practice-based evidence will be discussed in detail. Phases in the progress of a line of research and options for empirical design will be reviewed. Balancing internal and external validity to encourage timely translation into practice will be discussed as well as considerations and challenges in advancing rehabilitation research (e.g., heterogeneity of participants and interventions, fidelity assurance, dosing, blinding, nonspecific factors, measurement). Dr. Snyder-Mackler will demonstrate how the investigation of underlying mechanisms of action in high quality clinical trials and observational quasi-experimental studies within rehabilitation research is achievable, but is fraught with obstacles that do not happen in drug trials that typify clinical trials. Unlike the delivery of an active medication or placebo, rehabilitation interventions are typically multimodal and involve active participation of both the patient and the clinicians. Thus, defining of the intervention(s), assuring that the intervention(s) are reliably applied and defining the active component(s) are unique in studies of rehabilitation. This presentation will discuss the challenges and some approaches that successfully embed mechanistic investigation in clinical trials and observational quasi-experimental studies in rehabilitation. Dr. Lang's talk will focus on the major challenge that dosing presents for rehabilitation trials, i.e. that essential information about active ingredients, their biological targets and mechanisms of action, and their half-lives, are largely unknown. Key dosing parameters and how they might be measured and controlled in trial designs will be discussed, with the goal of maximizing the amount and specificity of knowledge gained from any trial. Finally, with electronic medical records (EMRs) collecting detailed patient, treatment, and outcome data now and even more in the future, how can we use this information to determine those interventions that are associated with better outcomes for patients with specified sets of characteristics? Dr. Horn will review how Practice-Based Evidence (PBE) study designs address these challenges and present an example of findings from a PBE study of 2130 patients with traumatic brain injury.

10:00 a.m. –12:00 p.m. Central and Peripheral Mechanisms of Rehabilitation
Balcony A

Moderator: Rick Lieber, Ph.D., *Rehabilitation Institute of Chicago*
Panelists: D. Michele Basso, Ph.D., *Ohio State University*; Monica Perez, Ph.D., *University of Miami*; Mike Boninger, M.D., *University of Pittsburgh*

In this session, we will discuss a variety of mechanisms of plasticity in rehabilitation. After presenting approaches to measuring brain, spinal cord and skeletal muscle function, we will discuss how rehabilitation and regenerative therapies can be applied to improve central and peripheral function. Dr. Lieber will begin with a discussion of human skeletal muscle adaptation to contractures that occur secondary to stroke and cerebral palsy. Intraoperative structural studies of these

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muscles reveal dramatic alterations in sarcomere length and number. The extracellular matrix (ECM) is also hypertrophic and does not appear to support a functional stem cell niche, resulting in overall muscle shortening and increased stiffness. Studies of gene expression and cellular populations in these muscles may provide insights into the development of new treatments for muscle contractures. Dr. Basso will address cellular mechanisms that may explain why SCI rehabilitation can be quite effective in some individuals while others show limited improvement. Using rodent models of contusion, her group determined when to deliver task-specific training and cellular factors that are conducive to motor learning. The findings suggest that inflammation in cord regions remote to the injury is a barrier to effective rehabilitation. In fact, animal models show that training delivered early after SCI during high inflammation worsens function but reducing this inflammation and allows robust locomotor recovery using a brief training paradigm. The source and genetic profiles of cellular inflammation have been identified which may allow development of biomarkers for rehabilitation. Dr. Perez will discuss neuroplasticity protocols used in humans with SCI and how non-invasive electrophysiology can be used to guide therapeutic interventions. The corticospinal tract is an important target for motor recovery after SCI. Using noninvasive techniques, Dr. Perez has developed tailored protocols for precise timing of the arrival of descending and peripheral volleys at corticospinal synapses of upper and lower limb muscles in humans with chronic partial paralysis. It is possible that tailored stimulation of the corticospinal pathway may present a novel therapeutic tool for enhancing residual motor output in motor disorders affecting the corticospinal tract. Finally, Dr. Boninger will present work in the area of Regenerative Rehabilitation—the integration of principles and approaches from the fields of rehabilitation science and regenerative medicine. Regenerative medicine focuses on the repair or replacement of tissue lost to injury, disease, or age, primarily via the enhancement of endogenous stem cell function or the transplantation of exogenous stem cells. A focus of Rehabilitation Science is the use of mechanical and other stimuli to promote functional recovery. His discussion will focus on the integration of these two approaches with the ultimate goal of optimizing independence and participation of individuals with disabilities.

10:00 a.m.–12:00 p.m. Bending the Arc of Technology Toward Rehabilitation and Health
Balcony B

Moderator: Aiko Thompson, Ph.D., *Medical University of South Carolina*
Panelists: Steve Cramer, M.D., *University of California, Irvine*; James Rimmer, Ph.D., *Lakeshore Foundation*;
Susan Magasi, Ph.D., *University of Illinois at Chicago*

The use of information and communication technologies (ICT) eliminates distance barriers and can make healthcare, rehabilitation and wellness services available to people who have limited access to transportation and other access issues. In this session, we will discuss how the integration of technology into these areas can promote better communication between healthcare professionals and patients, and thereby achieve healthy lifestyles and better quality of life. Many patients receive less than the optimal amount of rehabilitation therapy after stroke. Telehealth methods stand to bridge this gap. Dr. Cramer’s talk will examine opportunities for telerehabilitation, and will review experiences to date. The full potential of telehealth (eHealth) technology to reach a large number of people with disabilities who exhibit a range of physical and psychosocial secondary health conditions has yet to be realized. Dr. Rimmer’s presentation will describe the potential use of eHealth to promote greater interaction with participants transferring out of rehabilitation (full-management) and into a “mid-management” (a precursor to self-management and mHealth) telecoaching model that optimizes recovery. Finally, the expansion of smartphone use and app design is literally placing sophisticated rehabilitation interventions in the hands of people with disabilities. In this presentation, Dr. Magasi will review the state-of-the science of mRehab based on our rapid review of the literature. We will discuss an iterative design process that ensures that the needs and priorities of the disability community are reflected throughout the development and design process, including special design considerations related to accessibility and usability of mRehab interventions among people with disabilities. Currently, many patients after injuries and diseases are not able to receive the optimal amount of rehabilitation and healthcare services due to various reasons. With continuing growth in the internet access and smartphone use, the development of ICT applications can significantly broaden rehabilitation and healthcare opportunities for patients.

12:00–1:00 p.m. LUNCH

1:00–3:00 p.m. Transitions Across the Lifespan

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Room F1/F2

Moderator: Walter Frontera, M.D., Ph.D., *Vanderbilt University*

Panelists: Sharon Ramey, Ph.D., *Virginia Polytechnic Institute and State University*; Ellen Giarelli, Ed.D., RN, M.S., CRNP, *Drexel University*; Eric Lenze, M.D., *Washington University*

This session will focus on research related to the rehabilitation of persons of different age groups. Disability has an effect on growth and development, transitions to adulthood, and aging (particularly disabling medical conditions). At the same time, these processes can influence how individuals adapt to the presence of disability and the nature of their health care needs. Three presentations will address these issues. The first presentation by Dr. Ramey will identify critical gaps and controversies in current scientific evidence about alternative pediatric rehabilitation treatments during key transition periods in brain and behavioral development. Two important conclusions are that (1) the majority of prescribed, implemented, and insurance-reimbursed treatments do not produce detectable benefits, and some may be harmful; and (2) to date, the high-intensity treatments grounded in well-delineated operant learning principles have yielded the highest and most sustained benefits. Dr. Giarelli will discuss how patients must continually self-monitor, make health-related decisions, and negotiate control of health and health-care as they transition from adolescence to adulthood. Successful transitioning requires a family member that provides security and stability as well as the identification of bridges and barriers. Finally, Dr. Lenze will discuss some of the challenges in the rehabilitation of older adults, particularly given the high rates of cognitive, emotional, and motivational impairments in this population. More specifically, he will describe his work using a package of motivational and high-intensity therapy designed to maximize patient engagement and therapy intensity called Enhanced Medical Rehabilitation.

1:00–3:00 p.m.

Novel Outcomes in Rehabilitation and Integration Into Clinical Care Balcony B

Moderator: Jonathan Bean, M.D., MPH, *Harvard Medical School*

Panelists: Brad Dicianno, M.D., *University of Pittsburgh*; Melissa Morrow, Ph.D., *Mayo Clinic*; Brian Hafner, Ph.D., *University of Washington*

This session will introduce 3 lines of research highlighting novel outcomes in rehabilitation and the potential for integration into clinical care. Firstly, mobile health tools can empower patients to care for themselves and inspire clinicians to personalize care. As the mobile health field and technologies evolve, researchers will continuously be presented with challenges in the conceptual design and deployment of clinical trials due to the vast array of outcomes measures that can be collected. Dr. Brad Dicianno will present work on the Interactive Mobile Health and Rehabilitation (iMHere) system as an example of a mobile health system being used to collect ecological momentary assessment (EMA) outcomes data from patients. The potential impact on clinical care will be discussed. Second, wearable sensors monitoring different aspects of health are becoming more widely used in rehabilitation research as a method of capturing real world outcomes. Dr. Melissa Morrow will review current sensor based outcomes utilized in spinal cord injury rehabilitation research and explore the challenges of integrating this “big data” into clinical practice. Lastly, Dr. Brian Hafner will discuss how new approaches to outcomes measurement have also been applied to the development of patient-reported outcomes (PROs). National initiatives, like the Patient Reported Outcomes Measurement Information System (PROMIS) have resulted in rigorous frameworks for developing PROs that can evaluate health outcomes across different patient populations. Efforts utilizing these same methods to develop an item bank specific to measuring prosthetic mobility in people with lower limb loss will be described, and potential clinical applications will be presented. Following these presentations, we will discuss with attendees these and other novel outcomes and the inherent challenges and opportunities for integration within rehabilitative care.

1:00–3:00 p.m.

Using Data to Drive Discovery Room E1/E2

Moderator: Ken Ottenbacher, Ph.D., *University of Texas*

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Panelists: James Graham, Ph.D., *University of Texas*; Jennifer Hicks, Ph.D., *Stanford University*; Adrian Hernandez, M.D., *Duke University*

The first presentation will include an overview of the need for, and development of, data discovery in biomedical research and health care. Dr. Ottenbacher will discuss the resources and opportunities associated with the NIH Big Data to Knowledge (BD2K) initiative and the development of data repositories and networks by the NIH and other agencies. Next, Dr. Hicks will describe how the Mobilize Center, an NIH BD2K Center of Excellence is using modern data science tools to integrate and analyze data from wearable sensors, research labs, and clinics to understand and improve human mobility. Dr. Graham will describe opportunities for discovery using large administrative or public use databases such as Medicare claims and assessment files or U.S. Census data, including examples related to the Affordable Care Act and health care reform. Finally, Dr. Hernandez will present the role of data discovery in health services and outcomes research, with an emphasis on clinical and health systems applications. Examples will include the NHLBI's Heart Failure Research Network, the PCORNet, and the NIH's Health Systems Research Collaboratory.

1:00–3:00 p.m. Preventing Secondary Disability
Balcony A

Moderator: Diane Damiano, Ph.D., P.T., *NIH Clinical Center*

Panelists: Greg Hicks, Ph.D., *University of Delaware*; Diann Gaalema, Ph.D., *University of Vermont*; Sara Mulroy, Ph.D., *Rancho Los Amigos National Rehabilitation Center*

Our session will involve four speakers who will address different clinical research issues in four very distinct populations: children with cerebral palsy, elderly adults with low back pain, minority patients with cardiovascular disease, and those with shoulder pain secondary to using a wheelchair after a spinal cord injury. However, the talks will intersect and converge on these four broad themes: (1) importance of managing or preventing secondary disability to optimize health and functioning throughout the lifespan; (2) recognizing the major role of pain in further limiting function and mechanisms leading to pain; (3) involving all, especially those at greater risk, in the design of rehabilitation programs and in the ascertainment of strategies to increase access and compliance and (4) leveraging technological advances to enhance rehabilitation outcomes. Dr. Damiano will focus on activity promotion to maintain strength and fitness levels across levels of disability throughout the lifespan for those with cerebral palsy and on more recent efforts on preventing secondary disability through limiting primary disability in the first several months of life, with the themes of access to care and technology advances integral to both of these. Dr. Hicks will address pain, specifically low back pain (LBP) in older adults and resultant functional disability by identifying modifiable factors to improve outcomes. He has further designed novel interventions to address some of these factors, such as abnormalities in trunk musculature and hip joint pathology. Dr. Gaalema will focus primarily on the third theme to increase access to rehabilitation specifically cardiac rehabilitation, and compliance with important behavior modifications in those at highest risk, but will additionally show how technology can aid in this process. Dr. Mulroy will include multiple themes in her discussion of shoulder pain in wheelchair users after spinal cord injury (SCI) including secondary disability, biomechanical mechanisms as well as psychosocial aspects of pain, inclusion in design of rehabilitation programs and use of technology to advance assessment and outcomes. After short presentations, we will break into smaller groups around each of these themes to foster participation and finally and, most importantly, to invite and solicit audience questions and comments in the summary discussion of research gaps and opportunities.

3:00–3:30 p.m. BREAK AND POSTERS

3:30–4:30 p.m. Town Hall: Rehabilitation Research Plan
NIH Medical Rehabilitation Research Committee

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Members of the Trans-NIH Rehabilitation Research Coordinating Committee will receive feedback from conference attendees on the Rehabilitation Research Plan. This will be an open forum.

4:30 p.m.

Closing Remarks

Alison Cernich, Ph.D., ABPP-CN

National Center for Medical Rehabilitation Research