

Welcome to the Winter 2012 Edition of *CROR Outcomes*



Welcome to the Winter 2012 issue of *CROR Outcomes*! In this issue, we revisit a project first described in the Spring 2010 issue, Enhancing the NIH Toolbox's Accessibility and Usability. Drs. Susan Magasi and Mark Harniss discuss their findings and recommendations from the data they've collected,

and you can read about the implications of the study below.

Inside you'll also find a profile of a valued collaborator from CARF International (formerly the Commission on Accreditation of Rehabilitation Facilities). Chris MacDonell is a member of the Advisory Committee to the Rehabilitation Research and Training Center (RRTC) on Improving Measurement of Medical Rehabilitation Outcomes. We also profile

one of our newest Project Managers, Sara Jerousek. Read about her background and her contributions to patient recruitment on page 2.

We also describe an exciting new spinal cord injury (SCI) research project. As part of the SCI Model System, led by Dr. Chen, RIC received a five-year grant award from the National Institute on Disability and Rehabilitation Research (NIDRR) to explore secondary effects of ambulation therapy on patients with an incomplete spinal cord injury. The project, Mobility, Activity and Participation in Spinal Cord Injury (MAPS), is led by George Hornby, PhD.

Lastly, read about updates to our Rehabilitation Measures Database on page 6. We'd love your feedback in a quick survey about the website!

For more information about our projects and educational opportunities, please visit our page at www.ric.org/cror. And don't forget to "like" us on Facebook!

Allen Heinemann, Director

Christine MacDonell: Globetrotting Advisory Committee Member

When Christine MacDonell chose occupational therapy as her career, she never imagined it would be her ticket to see the world.

But as a top executive at CARF International (founded in 1966 as the Commission on Accreditation of Rehabilitation Facilities), she spends more time traveling than she does in her Washington, D.C. home. In the fall, her job took her to China, Korea, India, Italy, Ireland, England and Sweden. "I'm on the road the majority of the time," she says.

MacDonell's mission is to help inpatient rehabilitation facilities develop and maintain high standards of care for vulnerable populations such as individuals who have experienced stroke, limb loss, chronic pain, spinal cord and brain injuries.

But it doesn't stop there. CARF standards address health issues across the life span, from early childhood to advanced age.

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Project Update: Making the NIH Toolbox Accessible for People with Disabilities

The National Institutes of Health (NIH) have spent years and millions of dollars creating a set of instruments to assess physical, sensory and cognitive functioning as well as emotional health in people ranging in age from 3 to 85. The product of that effort is the NIH Toolbox Assessment of Neurological and Behavioral Function.

"The inclusion of people with disabilities in the Toolbox is important or they run the risk of being excluded from federally funded research in the future."

Allen Heinemann, Ph.D.

The Institutes' goal was to create a standardized way to measure patients' functioning and wellbeing at different life stages independent of their geographic location. The NIH recently tested the Toolbox on 4,500 individuals around the

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CROR Dissemination

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Sara Jerousek, CROR Project Manager

Sara Jerousek learned about rehabilitation the hard way.

As a field hockey player on an athletic scholarship at the University of Louisville, she tore the anterior cruciate ligament and both menisci in her left knee. Knee surgery was followed by rehabilitation, then another surgery and more rehabilitation. When a fellow player cracked a ball into her foot and broke the first metatarsal bone in her left foot, she underwent a third surgery to install a metal plate in her foot.

"I spent so much time in a PT gym that I got interested in therapy," says Jerousek, now a 26-year-old project manager at the Center for Rehabilitation Outcomes Research in Chicago.

Jerousek graduated in 2007 with a degree in exercise science and sports medicine, and then went to work at the University of Louisville as a research technologist in neuroscience.

But her roots in Chicago were calling her back. After moving back in 2009 to her hometown of Oak Park, Jerousek landed a position as a physical therapy assistant at an AthletiCo rehabilitation center. When she saw a listing for a research assistant position at the Rehabilitation Institute of Chicago, she jumped at it. "I knew RIC was an awesome place to work," she says.

Jerousek started at CROR in early 2010 as a research assistant interviewing spinal cord injury patients about their quality of life—everything from physical functioning to emotional wellbeing.

"She is very energetic, hard working and resourceful," says Allen Heinemann, director of CROR. "She has gained valuable experience as a research assistant, which she is building on in a new position."

Jerousek also was an active part of CROR's Environmental Factors project (See the **Summer 2010** issue for a full description), which involved creating a set of questionnaires for patients with spinal cord injuries, traumatic brain injuries and stroke that explored everything from their access to information technology to their level of social involvement in their communities.

The questionnaires were given to 100 people in each group and the results have been analyzed. Jerousek is part of the team that will be writing manuscripts about the study.

Jerousek was recently promoted to Project Manager, and her first task is gearing up for that study's next step: a two-day study of patients with spinal cord injuries, brain injuries or stroke. Each day will involve a four- to six-hour battery

of tests to measure individual's quality of life, including environmental factors, as well as cognitive, sensory, motor and emotional functioning using the NIH Toolbox. Participants will also complete neuropsychological tests and describe their participation in life activities.



Sara Jerousek

The goal, Jerousek says, is to "create measures that can be easily used by researchers and clinicians, ones that are effective and will provide useful information in early stages of recovery, as well as long-term care."

There is also a psychic payoff for the individuals who are contributing their time and effort. "It's an opportunity for them to be on the ground level of creating these instruments," she says. "Currently, there is an opportunity to develop a comprehensive way to measure someone's outcome after an injury."

RIC is responsible for a third of the project's total recruitment goal, or 200 participants, over the next two years. Although it's a daunting task, Sara's project team, including Ana Miskovic and Arielle Goldsmith, is enthusiastic and confident.

Getting patients to consent to participate in research is a bit of a sales job and is one of Jerousek's biggest strengths, Heinemann says. "You're trying to sell people on participation in an ethical

manner to avoid people saying "no, thanks." If they are ambivalent or uncertain, a good researcher will help allay concerns whether it's embarrassment, privacy concerns or time demands," he says. "She has

learned how to recruit patients for our studies and retain them."

Although she is on the research side of rehabilitation now, Jerousek would love to be able to combine patient care with research. She is currently saving money toward a master's degree by living at home with her dad, Stanley the dog and Flash the cat, who came with her from Kentucky.

"Research is on its way to becoming more meshed with clinical practice. That's my hope," she says. "They are two very different entities. I would love to do both!"

"She is very energetic,
hard working and resourceful."

Allen Heinemann, Ph.D.

Mobility, Activity, and Participation in Spinal Cord Injury



Dr. Chen

For patients with incomplete spinal cord injuries, being able to stand and take a few steps is a major accomplishment. But even after extensive therapy, many only achieve a halting gait that is a quite different from how they were able to move before injury.

An exoskeletal robotic device known as the Lokomat® has helped some patients relearn what it feels like to walk at a more normal pace. The Rehabilitation Institute of Chicago (RIC) has four Lokomat® devices that are used for research and patient services. But

with a \$250,000 price tag for each device, such technology is available to only a portion of patients that could benefit from it.

As part of a research study, researchers at RIC devised a more affordable way to achieve similar results—a treadmill supplemented with a pulleys and weights to partially or completely support a patient's weight. If necessary, therapists help move the patient's legs, while the patient is in the device, which allows the person to walk in a relatively normal manner.

Dr. David Chen, one of the study investigators, calls it an affordable Lokomat®; it is now in use at RIC as well as other rehabilitation centers around the country.

The patient outcomes are encouraging. Using the treadmill system has resulted in improvements in patients' ability to walk. It also slows the physical deterioration that many spinal cord injury patients experience over time. "Unweighting the individual allows the legs to move in a more normal pattern. And that helps the brain and spinal cord relearn a walking pattern," Chen says.

Now, Chen and his co-investigator Allen Heinemann, director of the Center for Rehabilitation Outcomes Research, are taking their research to the next step. They received a five-year grant award from the National Institute on Disability and Rehabilitation Research (NIDRR) to continue funding the **Midwest Regional Spinal Cord Injury Model System of Care**. Among the goals of the Model System is to establish innovative projects for the delivery of rehabilitation services to meet the needs of individuals with spinal cord injury.

To that end, a project was developed to explore secondary effects of ambulation therapy on patients with an incomplete spinal cord injury. This project goes by the acronym MAPS for Mobility, Activity and Participation in Spinal Cord Injury. George Hornby, PhD, a researcher at RIC and assistant professor at the Feinberg School of Medicine, is principal investigator of the project.

Despite medical advances in treating patients with an acute spinal cord injury, improvements in patients' mobility has "remained stagnant over the past 30 years," the investigators noted in their grant application. That lack of progress comes even as the number of patients with sensory and motor functioning below the primary level of injury has steadily increased during the past few decades.

Getting patients up and walking sooner should create a virtuous cycle of health benefits, the researchers believe. Patients will retain more muscle and bone mass, which is typically lost at a dramatic rate in the early months after a spinal cord injury. Loss of muscle leaves patients weak and debilitated while losing bone makes them more prone to fractures from osteoporosis, a common complication.

The aggressive walking therapy also should reduce the risk of pressure sores, another common complication following spinal cord injury, because they are not resting in the same position as long. "The hope is the more active they are, the healthier they are and the

less risk they have for secondary complications," Chen says.

The researchers have an ambitious goal of recruiting 80 patients with recent injuries during a five-year period. Most of them will come to RIC for their acute inpatient rehabilitation. Many of them will have sustained injury due to a car crash or gunshot wound, while others will have been injured by falling. Researchers plan to recruit a group that cuts across age ranges, from young adults to the elderly.

The walking intervention will be introduced early after injury and will be intense and aggressive because that is what the researchers believe will yield the most benefits. They don't expect the long hours of hard work to deter potential study participants.

"Generally, that's what patients from past studies were looking for," Chen says. "They want to do something that will promote recovery."

The study is conducted under the auspices of the Midwest Regional Spinal Cord Injury Care System, one of the original five spinal cord injury care centers designated by NIDRR almost 40 years ago. Chen, who is the director of the spinal cord injury rehabilitation program at RIC, co-leads the Midwest system with Dr. Heinemann. He also heads the acute spinal cord injury program at Northwestern Memorial Hospital.

The goal of the model systems program is to evaluate innovative interventions and to study and evaluate the delivery of services to spinal cord injury patients. The Midwest system is one of 14 centers around the country to evaluate improved standards of care and provide continuing education related to spinal cord injury.

Each center can propose one or more collaborative projects and is required to participate in two. "We've decided to participate in six. We're over-achievers in that respect," says Heinemann.

The ambulation trial, which is being conducted only in Chicago, will be randomized and controlled. Patients who receive the high-intensity walking therapy will be compared with those in a control group undergoing standard rehabilitation. Changes in strength and conditioning will be evaluated after 12 weeks but the study won't stop there.

Patients will be tracked in their home and community environment for three to six months to learn if increased physical ability and mobility are sustained.

The researchers won't just rely on patients' self-reports. They will use geospatial technology and accelerometers worn on patients' ankles to track the movement and speed of study participants.

Improved walking ability should result in greater mobility in the community, but Chen isn't sure that will be the observed outcome.

Some patients may believe they move faster and more efficiently in a wheelchair; others may fear testing their walking ability outside the safe confines of a controlled experiment. "They may think, 'I do fine in a laboratory; but, that isn't the real world,'" Chen says.

The ultimate goal is to improve the quality of life for people with a spinal cord injury, which involves helping them participate actively in their communities. "We want to access how much patients reintegrate into their community and how our interventions help to implement re-integration," Hornby says. "We're optimistic that they will."



Dr. Hornby

Chris MacDonell (Continued from page one)

CARF standards and the accreditation process responds to vulnerable populations with addictions, the homeless, individuals in foster homes and adoptions, individuals with autism, developmental disabilities and those with dementia.

MacDonell brings that perspective to the advisory committee of the Rehabilitation Research and Training Center (RRTC) on Improving Measurement of Medical Rehabilitation Outcomes. As a member, she will be attending the RRTC's State of the Science Conference on Outcome Measurement in Medical Rehabilitation in March of 2012. She will be on a team that helps develop recommendations for future research priorities.

Additionally, MacDonell was invited to sit on a quality measures technical expert panel hosted by Dr. Anne Deutsch (see Quality Measures for Stroke Events, Fall 2011). MacDonnell's experience with CARF and her years of experience in developing CARF standards made her an invaluable presence on the panel.

"Christine has an international perspective on rehabilitation services across a wide span of populations and settings," says Allen Heinemann, director of the Center for Rehabilitation Outcomes Research at RIC. "She appreciates the different ways organizations deliver high-quality rehabilitation services. It's not one size fits all."

MacDonell agrees that the way services are delivered can vary by country or region but still meet CARF's demanding standards. For instance, patients in U.S. rehabilitation facilities spend relatively short periods in hospitals compared with those in other countries. But the U.S. has a greater continuum of care than many countries, she says, so patients continue to receive services and treatment after leaving an inpatient setting.

Yet one thing remains constant: Rehabilitation networks everywhere are feeling the strain of tight budgets and increasing elderly populations. "We

have decreasing resources and increasing needs because all around the world, people are aging and there is greater need for services," MacDonell says.

MacDonell started her career as an occupational therapist in Los Angeles. She moved up to become an administrator in a California rehabilitation hospital. In 1991, MacDonell joined CARF, a non-profit organization that was founded in 1966 - around the time the law providing Medicare coverage was passed.

As managing director of medical rehabilitation, MacDonell revises and develops standards for rehabilitation facilities. She also educates providers on standards and trains the surveyors who go out in the field to conduct evaluations.

"My job is to make sure that standards are state of the art and that we are engaging the field in our process," MacDonell says. It's also part of her job to write articles and book chapters as well as participate in panels at conferences. "We are the face of CARF," she says.

When MacDonell started with CARF 20 years ago, the organization was only active in the U.S. and Canada. It now operates in 20 countries. In 2010, about 6,100 CARF-accredited facilities served 7.8 million people worldwide.

"The moral owners of CARF are the people who are served in our accredited programs," MacDonell says. "Those are the people we can't fail to protect."



Acknowledgements

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Articles written by Susan Chandler.

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Accessibility in the NIH Toolbox (Continued from page one)



Dr. Magasi

country and was satisfied that it produced consistent results.

A key to the NIH Toolbox's effectiveness is giving the same tests in exactly the same manner over and over so results can be compared. But it was beyond the scope of the original effort to include individuals with disabilities, even though they make up almost 20 percent of the U.S. population.

Susan Magasi, PhD, a researcher and assistant professor at Northwestern University's Feinberg School of Medicine in the Department of Medical Social Sciences, believes that it is crucial for the NIH Toolbox be accessible to people with disabilities as a matter of social equity. She and Mark Harniss, PhD, a Clinical Associate Professor in the Department of Rehabilitation Medicine at the University of Washington, have studied how well the NIH Toolbox works for stroke survivors as well as people with spinal cord or traumatic brain injuries. After studying 10 individuals in each category, they found room for improvement.

"We wanted researchers who use the Toolbox to get good and meaningful results. In the rehabilitation world, researchers are used to manipulating the environment to promote participation among people with disabilities," says Magasi, who did post-doctoral work at RIC's Center for Rehabilitation Outcomes Research. "It's often done at an intuitive level behind the scenes. When you start applying that to a standardized testing context, there is an inherent tension."

In fact, the scientists who created the Toolbox were worried that if too many accommodations were made for people with disabilities, it would change the procedures so that results couldn't be compared. "There was a concern that we could deviate too far and thereby render the norms invalid," she says.

In the rehabilitation world, researchers are used to manipulating the environment to promote participation among people with disabilities . . . When you start applying that to a standardized testing context, there is an inherent tension.

Susan Magasi, Ph.D.

Making Modifications

So Magasi and Harniss set out to do two things—find out which of the NIH Toolbox's roughly 40 tests presented problems for the three patient groups and identify changes that could be made without compromising the Toolbox's validity.

Not all the tests required modification. But among those that did, the researchers came up with two broad categories of adjustments. One is comprised of accommodations that do not alter the core construct being measured. The second goes further and significantly changes the testing protocols. This, the researchers suggest, should be noted as a "non-standard" administration of the test.

In some cases, the solutions were simple. Take the olfaction measure. The Toolbox calls for using cards that subjects scratch and

sniff and then match to choices on a computer screen to assess awareness of scents.

If a person isn't able to scratch the card or manipulate a computer mouse, a test administrator can scratch the card and record the answer for them -- it doesn't influence their ability to identify smells.

Other seemingly similar adjustments are not so clear cut, Magasi says.

The Toolbox displays questions on a computer screen to assess emotional health. That procedure doesn't work well for those who cannot read because of a visual processing issue. Having someone read the questions to the subjects seems like a workable accommodation. However, the researchers had to consider whether that modification might influence the answers.

Would a subject be less willing to admit feeling sad, being isolated or lonely if another person was in the room? It's a definite possibility, Magasi acknowledges.

In that case, she and Harniss advised that the adjustment to the test be flagged for researchers as a non-standard administration.

Still, some information is better than none, she believes. "It allows you to collect data on people with disabilities, particularly if you are tracking them over time instead of saying, 'We're not going to bother testing them at all.'"

One possible solution, Magasi says, is to include a text-to-speech function that would allow the computer to read the questions to the patients while preserving their privacy.

In some parts of the Toolbox, Magasi and Harniss struggled to find alternative ways to administer tests. Take endurance, for example. The Toolbox's endurance test involves walking, something

that those with a complete spinal cord injuries can't do.

But some partially paralyzed patients have great endurance, enough to participate in marathons.

Magasi and Harniss considered recommending an accommodation for the endurance test using an arm bike, but the feasibility of this solution depends on the person's level of

injury and amount of arm function. For now, the researchers aren't recommending that as an accommodation, but it's definitely an issue they will take up in the future, Harniss says.

Of course, it does no good to make so many accommodations for people that they score high in areas where they actually have deficits. A partially blind person shouldn't do well on a visual acuity test. "But a person who is blind can do a memory or vocabulary test," Magasi says. "It's teasing out what you're testing from how you're testing it."

Recommendations and Awareness

Concerns about scoring low on a test is not unique to the disability community. And discussing how to explain to test partici-



Dr. Harniss

Rehabilitation Measures Database Update

Thanks to a generous grant award by the Retirement Research Foundation, the Rehabilitation Measures Database team has been working on a new set of instrument summaries designed specifically for use with older adults. This effort has been divided between two fronts; the first is focused on enhancing instrument summaries currently in the database with geriatric-specific administration, norms, considerations and supporting psychometric data, while the second focuses on summarizing new instruments.

As part of that effort, staff members are conducting a survey that has, to date, received nearly 350 responses from users in 8 countries. This feedback will help shape the database as it evolves over the next several years. Because the survey remains open, only preliminary results are available.

So far, user feedback suggests the three most popular measures used in geriatric rehabilitation are the Timed Up and Go test, the Berg Balance Scale and the Tinetti Gait and Balance Test. Users would like greater access to measures assessing cognitive functioning as well as additional measures of gait and vestibular functioning.



In addition to suggesting new measures, users have also provided a wealth of feedback on the database's features and functionality. For example, users have requested video demonstrations, better mobile accessibility (a tablet or smart phone app) as well as a greater variety of measures. All these suggestions have been added to the website's "wishlist." In the mean time, "like us" on CROR's Facebook page to receive announcements and updates.

Since its launch just a year ago, the website has grown tremendously. The site now hosts nearly 15,000 users a month from well over 100 countries. The feedback users are providing will help 2012 be another year of growth.

If you haven't already taken the survey, please take a few minutes to make your voice heard! The survey can be accessed at:

http://www.surveymonkey.com/s/geriatric_measures

Recent CROR Dissemination Activities

Manuscripts

Heinemann AW, Deutsch A. Commentary on "Past and Present Issues in Rasch analysis: The FIM revisited." *Journal of Rehabilitation Medicine* 2011; 43: 958-960.

Mallinson TR, **Bateman J**, Tseng H-Y, Manheim L, Almagor O, **Deutsch A, Heinemann AW.** A Comparison of Discharge Functional Status After Rehabilitation in Skilled Nursing, Home Health, and Medical Rehabilitation Settings for Patients After Lower-Extremity Joint Replacement Surgery. *Archives of Physical Medicine and Rehabilitation*, 2011;92:712-20.

Presentations

Deutsch A. Quality Measures for Rehabilitation: Patient, Provider and Payer Perspectives. Association of Rehabilitation Nurses 37th Annual Educational Conference. Las Vegas, NV; November 3, 2011.

Deutsch A, Graham JE. **Strengths and Limitations of Selected Large Datasets.** Presentation at the American College of Rheumatology/Association of Rheumatology Health Professionals Scientific Meeting, Chicago, IL; November 9, 2011.

Deutsch A, Zollar C. **Ready for Your Future? How CMS Proposes to Change Payment for Post-Acute Care Providers: A Report From the Post-Acute Care Payment Reform Demonstration and Other Research.** Presentation at the American Academy of Physical Medicine and Rehabilitation Annual Assembly and Technical Exhibition. Kissimmee, FL; November 18, 2011.

Heinemann AW. **An Introduction to the NIH Toolbox for Stroke Rehabilitation Research and Care.** Lecture presented at Symposium 2011: Stroke Rehabilitation - Clinical Trials and Research Update, Weill Cornell Medical Center, New York, NY, November 5, 2011. November 4, 2011.

Book Chapters

Deutsch A. **Economics and Health Policy in Rehabilitation.** In: Jancelon, C, editor. *The Specialty Practice of Rehabilitation Nursing: A Core Curriculum*, 6th edition. Rehabilitation Nurses' Foundation, 2011.

See more at:

<http://www.ric.org/research/centers/cror/publications/index.aspx>

Accessibility and NIH Toolbox (Continued from page five)

pants that they aren't expected to "ace" everything is important. Magasi and Harniss believe their work has sensitized the NIH Toolbox team about that issue.

"In our daily life, we employ a lot of strategies to help us with what we're not great at doing. The Toolbox strips away those strategies. It puts people face-to-face with their deficits," Magasi says.

Among their recommendations, Magasi and Harniss suggest having a simple discussion with test subjects beforehand to help them become more comfortable with the idea that they are not expected to do everything well.

"These tests are designed with enough of a ceiling so that most people aren't going to reach the top," Harniss says. "They are intended to be harder than most people can achieve."

The unease may extend to clinicians who find themselves administering the tests. Some who are not used to working with people with disabilities may be anxious. "They're nervous because they are afraid of doing something wrong or offending. Or they are afraid of someone

getting hurt," Magasi says. "By making some very simple changes, we were able to alleviate that stress and anxiety; these changes made for a much better experience for everyone."

With data collection complete, Magasi and Harniss are in the process of completing their reports. A technical report focuses on the design features of the toolbox tests; another puts forth reasonable accommodations to the tests that clinicians can use.

Magasi praises the NIH for considering the accessibility issue early on. And she believes the study has made the Toolbox much more accessible to people with disabilities than it would otherwise have been.

But there is much more to be done, she says: "There are definitely opportunities for future research."

Allen Heinemann, director of CROR, concurs and says there is an important issue at stake: "The inclusion of people with disabilities in the Toolbox is important or they run the risk of being excluded from federally funded research in the future."

Dr. Dan Riddle Visits RIC

As part of the NIDRR Invited Lectureship in Outcomes Research, CROR was proud to welcome Dr. Dan Riddle in February 2012.

Dr. Riddle, PT, PhD, FAPTA is the Otto D. Payton Professor in the Department of Physical Therapy at Virginia Commonwealth University. He also the assistant chair and department coordinator of the School of Allied Health Professions' Ph.D. distance-learning program. His primary research interests are in the areas of recovery following knee arthroplasty, musculoskeletal diagnosis, outcomes and prognoses of musculoskeletal disorders.

Dr. Riddle gave a Grand Rounds presentation at the Rehabilitation Institute of Chicago titled, "Assessing Outcome of Individual Patients." In this presentation, he described evidence-based methods for assessing the responsiveness of patient reported outcome measures, illustrated problems with more traditional methods of assessing change, and presented the optimal approach for applying evidence to enhance interpretation of outcome measures.

Dr. Riddle met with various RIC investigators and clinicians, and also met with post-doctoral fellows in the Institute for Healthcare Studies and the Department of Physical Medicine and Rehabilitation of Northwestern University's Feinberg School of Medicine.

This lectureship is funded by the National Institute on Disability and Rehabilitation Research (NIDRR), as part of the Rehabilitation Research and Training Center (RRTC) on Improving Measurement of Medical Rehabilitation Outcomes.

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We are particularly interested in candidates who share an interest in rehabilitation outcomes research and have an interest in contributing to the Rehabilitation Research and Training Center on Improving Measurement of Medical Rehabilitation Outcomes (<http://www.ric.org/research/centers/cror/projects/RRTCImprovingMeasurement/RRTC-Improving.aspx>).

Applicants should submit their curriculum vitae, detailed statement of career objectives and research interests, official graduate transcripts, and two letters of recommendation to:

Allen Heinemann, PhD, Co-Chair, Executive Committee, Fellowship in Health Services Research, Rehabilitation Institute of Chicago, 345 E. Superior Street, Chicago, IL 60611 (a-heinemann@northwestern.edu).