

2016 Community Health Needs Assessment



Contents

Executive Summary	3
About the Rehabilitation Institute of Chicago.....	4
The Community that RIC Serves	6
Evaluating Our Actions	8
Expanding Access to Rehabilitation Health	9
Research at RIC	16
Improved Access to Information.....	19
Education and Training	20
Support Programs	22
How RIC Conducted This Assessment	24
The Identified Community Health Needs.....	32
Existing Resources	34
Citations	35

**Rehabilitation Institute of Chicago
2016 Community Health Needs Assessment**

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Executive Summary

Effective 2010, the Patient Protection and Affordable Care Act¹ (the “Affordable Care Act”) requires hospitals such as the Rehabilitation Institute of Chicago (“RIC”) to conduct a Community Health Needs Assessment (“CHNA” or “Assessment”) every three years. In addition, each hospital is to develop an Implementation Strategy (“Strategy”) to address the community health needs identified through the CHNA.²

RIC developed and conducted its CHNA in 2016, taking into account input from persons who represent the broad interests of the community served by RIC. RIC reviewed data and articles regarding rehabilitation health needs from a wide variety of sources, hosted a focus group of community representatives, and received feedback from the Illinois Department of Public Health in order to identify the rehabilitation needs of the community. RIC found significant health needs in the areas of Rehabilitation Health, Research, Access to Information, Education and Training, and Support Programs. In response to the CHNA, RIC will prepare an Implementation Strategy to identify the programs and resources RIC will employ to address the significant health needs identified in the CHNA.



About the Rehabilitation Institute of Chicago

In 1951, Dr. Paul Magnuson, a renowned orthopedic surgeon devoted to the ongoing care and recovery of patients suffering from injuries and disabilities, raised funds to start a one-of-kind hospital to focus on such patients. Dr. Magnuson purchased a vacant printing building on East Ohio Street in Chicago, and a new organization was formally incorporated as the not for profit Rehabilitation Institute of Chicago. In the spring of 1953, the building was converted into a small rehabilitation hospital and began serving a limited number of outpatients. In 1958, the building was renovated, enabling the hospital to serve inpatients. In 1964, RIC began training Northwestern University medical students. In 1965, Dr. Henry Betts was hired as Medical Director and was charged with assembling an expert clinical team. In 1967, RIC entered into an academic affiliation with Northwestern University, establishing a residency program and soon thereafter appointed its first chief scientist. In 1974, RIC moved to a new, 20-story facility at its current location.

Today, RIC, an Illinois not for profit corporation, operates a research-based health care system specializing in providing comprehensive rehabilitation services to the physically disabled through an array of diagnostic and therapeutic services. Its mission is rooted in its dedication to providing the highest quality patient care and outcomes through integrated research, scientific discovery, and education. As part of this system of care, RIC currently operates a 182-bed hospital and provides a wide scope of outpatient services from its primary location at 345 E. Superior Street in Chicago, Illinois as well as almost forty additional locations through wholly-owned or other alliance structures with other hospital systems throughout Illinois and Indiana. Over the years, RIC has earned an international reputation for excellence in patient care, medical research, and professional training. In 2015, for the twenty-fifth year in a row, RIC was ranked by U.S. News & World Report as the leading rehabilitation hospital in the United States. In fact, RIC is the only hospital in the country of any kind that has earned this ranking for twenty-five consecutive years. RIC serves patients from around the globe. In fiscal year (FY) 2015, for example, RIC treated more than 6,300 inpatients throughout its system of care and delivered over a million outpatient therapy units. RIC's facilities are staffed by approximately 1,700 medical professionals and support personnel, a dedicated team who in FY 2015 treated patients from 43 states and handled referrals from 61 countries.

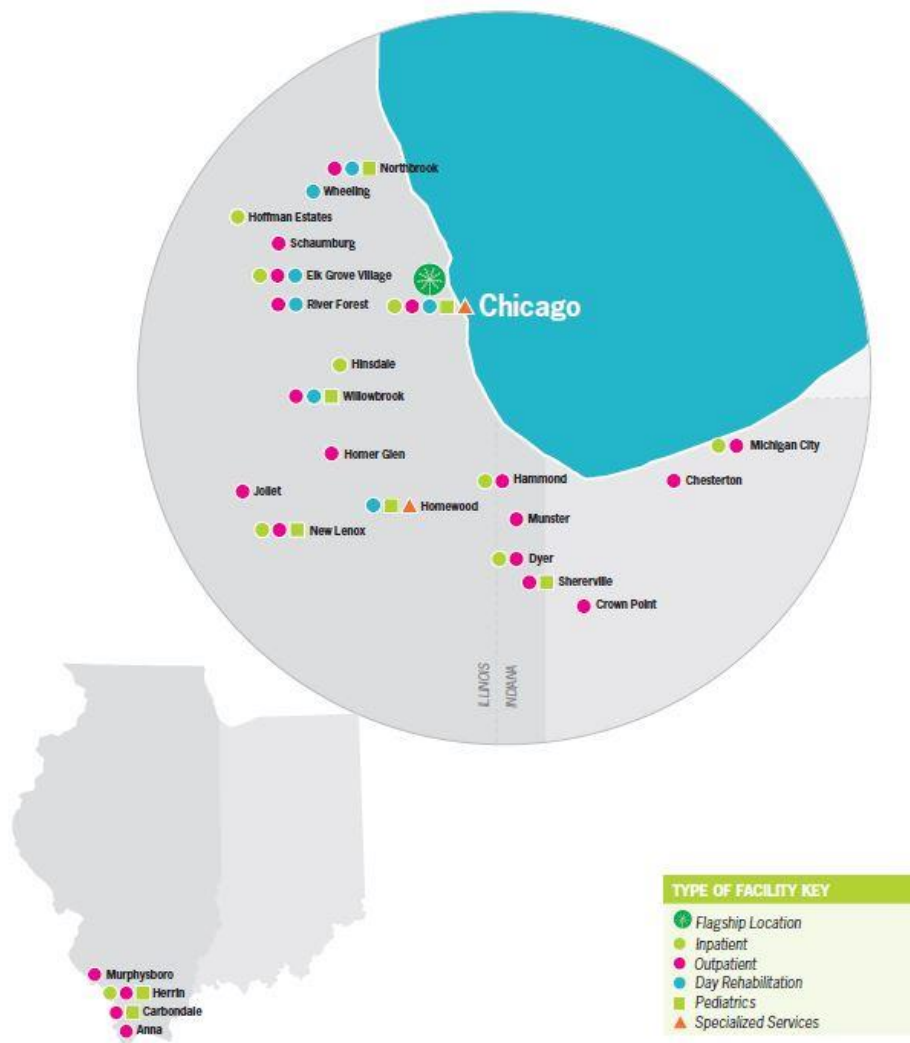


Figure 1 shows where RIC’s sites of care are located in the Illinois and northwestern Indiana areas, including its wholly-owned and alliance care sites.

Figure 1. RIC Sites of Care

RIC is one of only 3% of the nation’s nearly 6,000 hospitals to have achieved three consecutive Magnet designations for nursing excellence from the American Nurses Credentialing Center (ANCC) and the only free-standing acute inpatient rehabilitation hospital to have this distinction.

The Community that RIC Serves

RIC's community is made up of individuals in Chicago and the surrounding area with a need for inpatient, outpatient, or day rehabilitation physical medicine and rehabilitation.

In conducting its Assessment, a hospital facility may take into account the relevant facts and circumstances in defining the community it serves, including the geographic area served by the hospital facility, target populations served (for example, children, women, or the aged), and principal functions (for example, focus on a particular specialty area or targeted disease).³ However, a hospital facility may not define its community in a way that excludes medically underserved, low-income, or minority populations who are part of its patient populations, live in geographic areas in which its patient populations reside (unless they are not part of the hospital facility's target populations or affected by its principal functions), or otherwise should be included based on the method used by the hospital facility to define its community.⁴ A hospital must also include all patients regardless of "whether their insurance or they pay for the care received or whether they are eligible for assistance under the hospital facility's financial assistance policy."⁵ For purposes of this Assessment, RIC's community is focused on its primary role as a rehabilitation hospital as well as by the local geographic area it serves. Moreover, RIC's assessment included a broad and all-encompassing assessment of the needs of all individuals in its community with a need for physical medicine and rehabilitation services, as is further described below.

RIC's Role as a Rehabilitation Hospital. RIC's focus on Advancing Human Ability™ includes serving an array of patients with rehabilitation needs, including patients with amputations and other limb deficiencies, neuro-musculoskeletal injuries, brain injuries, spinal cord injuries, pediatric rehabilitation, stroke rehabilitation, and cancer rehabilitation, both from an adult and pediatric perspective. RIC treats patients to improve and eliminate the effects of injury, disease, and debilitating health conditions.

RIC's Role in the Relevant Geographical Area. RIC's community is further defined by Chicago and the surrounding Illinois counties, which are home to approximately 8.6 million people. The counties are Cook, DeKalb, DuPage, Kane, Kankakee, Lake, McHenry, and Will counties. This area is home to a diverse population, as shown by the data in Table 1. In calendar year 2015, 21,474 patients were discharged from IRFs located in these eight Illinois counties.

As shown in Figure 2, most patients who receive care at RIC are from the Chicagoland area. RIC reviewed reviewed its patient origin to determine its

geographical community. In CY 2015, 92% of RIC inpatients, 96% of outpatients, and 91% of DayRehab patients were from Chicagoland (the counties of Cook, DeKalb, DuPage, Kane, Kankakee, Lake, McHenry, and Will in Illinois).

RIC’s Role in Providing Care to Medically Complex Patients. RIC’s patients are some of the most medically complex patients requiring rehabilitative care. The Case Mix Index (“CMI”) provides one measure to objectively determine a patient’s medical complexity. Namely, a higher number indicates more complexity. “A hospital’s CMI represents the average case mix group (CMG) relative weight for that hospital. It is calculated by summing the CMG weights for all Medicare discharges and dividing by the number of discharges.”⁶ RIC’s CMI in many areas of care is higher, often substantially so, than the equivalent regional or national CMI. For example, the CMI for spinal cord injury patients at RIC in CY 2015 was approximately 2.0, while the CMI for such patients in regional IRFs that same year was only approximately 1.5.

Age and Race of Patients. In preparing the Assessment, RIC reviewed age, race, and ethnicity information for IRF patients. Nationally, older adults make up the largest percentage of users of rehabilitation services. Moreover, as stated above, a hospital facility may not define its community in a way that excludes medically underserved, low-income, or minority populations who are part of its patient populations. Table 1 indicates the race and ethnicity of individuals in the Chicagoland area, and compares it to the racial and ethnic breakdown of patients recently discharged from RIC and patients recently discharged from all Chicagoland IRFs. As the table indicates, RIC sees more patients who identify as African-American, Hispanic, or other minority population than do other IRFs in the Chicagoland area.

	White	African-American	Hispanic	Other
% of Population in Chicagoland Area	52.2%	17.2%	22.8%	7.8%
% of Patients Discharged from RIC (CY 2015)	56.67%	22.57%	8.11%	10.56%
% of Patients Discharged from Chicagoland IRFs (CY 2015)	62.52%	18.69%	8.52%	7.68%

Table 1.

Overall, RIC’s determination of its community of care for this Assessment took into account these functional, geographical, and demographic considerations.

Evaluating Our Actions

A hospital's CHNA includes an "evaluation of the impact of any actions that were taken...to address the significant health needs identified in the hospital facility's [immediately preceding] CHNA."⁷ In the 2013 Assessment, RIC identified the following significant community health needs: Rehabilitation Health, Research, Improved Access to Information, Education and Training, and Support Programs. These needs were prioritized on the basis of the health disparities associated with the injuries and other medical conditions treated at RIC, as well as the importance the community placed on addressing the need. RIC has made an effort to address each identified health need, as discussed in this section of our Assessment.



Evaluating our Actions: Expanding Access to Rehabilitation Health

RIC currently operates a system of care consisting of a 182 bed hospital and outpatient facility, located at 345 East Superior Street in Chicago, Illinois, as well as a number of other facilities and joint ventures. On February 5, 2013, the Illinois Health Facilities and Services Review Board granted RIC a licensure for 242 beds for its new research hospital and outpatient facility currently under construction at 355 East Erie, Chicago, IL. This will greatly improve the ability to serve more individuals with a rehabilitation need. RIC offers a comprehensive range of inpatient, day rehabilitation and outpatient services throughout the System. Inpatient rehabilitation services are provided using a multidisciplinary approach. Day treatment rehabilitation consists of a multidisciplinary approach for individuals no longer requiring the 24-hour nursing services provided in an inpatient setting. Outpatient care is typically singular discipline (e.g., physical therapy) and offers various levels of therapeutic intensity, depending on the patient's needs and goals. In the years following the 2013 Assessment, RIC has treated an average of more than 6,400 inpatients through its system of care and delivered over a million outpatient therapy units each year. RIC's facilities are staffed by approximately 1,700 medical professionals and support personnel.

Each patient at RIC is assigned a personalized care team consisting of the field's most well-trained rehabilitation doctors, nurses, therapists, care managers and clinical specialists. No other specialty hospital in the nation has a more experienced track record of being rated #1 for twenty-five consecutive years.

In the years since RIC completed its 2013 CHNA, RIC provided inpatient, outpatient, and day rehabilitation care and other services in the areas of stroke, spinal cord injury, brain injury, neuro-musculoskeletal conditions, pediatric care, and cancer, in order to meet the significant health needs identified in the 2013 CHNA.

For example, in FY 2015, RIC provided care to 2,504 inpatients, 11,939 outpatients, and 2,043 DayRehab patients. Since RIC's last Assessment was completed at the end of FY 2013, RIC provided care to over 10% more patients participating in its DayRehab program each year. RIC's DayRehab program is a community based programs where RIC clinicians work together to develop a treatment plan based on each patient's strengths, limitations, and personal goals. Team members communicate daily about how patients are doing, regularly evaluate their progress, and revise treatment plans accordingly. The intensity of the individualized DayRehab program is modified based on clinical recommendations and patient's insurance plans to maximize ability. For example, some patient's programs will consist of 3 hours of therapy per day, 2–3 days per week. For others, a program may be designed to have 6 hours of therapy per day, 5 days per week. There also have been increases in the

inpatient rehabilitation program (which is capacity constrained and why, in part, a new research facility is being constructed) as well as in the outpatient programs.

Patients who received care at RIC since the 2013 CHNA were more medically fragile than patients at other IRFs, regionally and nationally. Figure 2 compares RIC's CMI in the areas of stroke, brain injury, spinal cord injury, orthopedic, neurological, and medical rehabilitation to comparative values for the region and the nation for CY 2015. RIC's CMI in each area of care is higher, often substantially so, than the equivalent regional or national CMI.

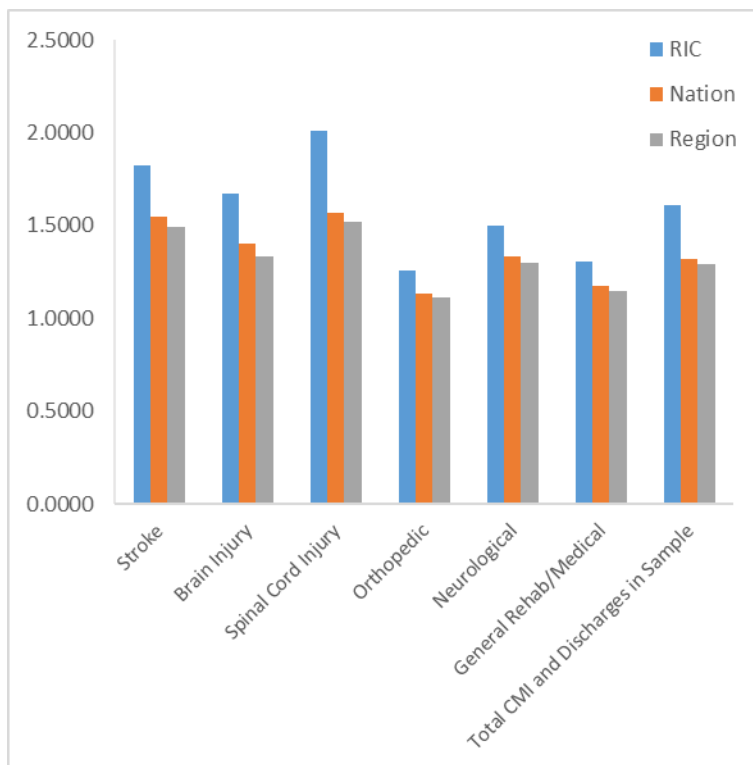


Figure 2. CMI Values for RIC, the Region, and the Nation for Calendar Year 2015. The Regional values include Illinois, Indiana, Michigan, Ohio, and Wisconsin CMIs.

The following sections provide further detail about the kind of care that RIC has provided to its patients that address the significant rehabilitation health needs of RIC's community.

Amputation and Limb Deficiencies. The RIC Amputation and Limb Deficiencies Care program is dedicated to treating people with amputations and limb deficiencies to achieve the best quality of life. An RIC Care Team is assigned to each patient. The RIC Care Team may include nurses, physical and occupational therapists, pain management specialists, speech-language pathologists, counselors and nutritionists specializing in working with amputee and limb deficiency patients. Together, the Care Team and the patient develop an individualized comprehensive care plan. Most

frequently, patients with amputations are seen in the multidisciplinary Amputee Clinic. Visits may include seeing a physician, a prosthetist, and an occupational and/or physical therapist at the same time. In this way, clinicians can work together, dealing with any problems or issues as a team. Each Amputee Clinic is led by a physiatrist (a physician specializing in physical medicine and rehabilitation) who is an expert in the care of people with limb loss. A prosthetist usually also attends each clinic.

Arthritis and Joint Conditions. RIC offers comprehensive arthritis rehabilitation for people whose functional abilities have been affected by arthritis (osteoarthritis, psoriatic, rheumatoid), hip fractures, joint replacement, orthopedic conditions, osteoporosis, spine disfiguration as well as balance, rheumatologic or musculoskeletal disorders. Some of the therapies offered at RIC include the newest arthritis drugs, injectable therapies, and individual and group therapy. RIC's physiatrists and rheumatologists lead teams that include rehabilitation nurses, physical and occupational therapists, as well as alternative health providers who specialize in arthritis and joint pain.

Back Injuries and Back Pain. RIC has provided services for patients of all ages requiring physical rehabilitation for back, neck, and other musculoskeletal conditions, which include sports and work-related injuries. Customized treatment plans are developed using state-of-the-art equipment and diagnostic tools. Comprehensive care plans employ a kinetic chain approach that treats the person, not the diagnosis, with the overriding goal of helping the patient manage their condition more effectively. In addition to facilitating recovery, emphasis is also placed on prevention of re-injury. The treatment plan comprises not only medical care and specialized therapies (physical, occupational, massage, acupuncture, chiropractic, and spinal injection) but may also incorporate athletic training and orthotics. RIC has offered these programs with a strong emphasis on rehabilitation of musculoskeletal conditions and sports medicine.

Brain Injury Medicine and Rehabilitation. RIC's specialized team of brain injury experts includes a neurologist, physiatrists, nurses, clinical social workers, psychologists, occupational and physical therapists, speech and language pathologists, and other specialists. Patient treatments are individualized and modified as recovery progresses. Together, the rehabilitation team, patient and family, set appropriate goals and work together to achieve these goals.

Cancer Rehabilitation. The RIC Cancer Rehabilitation Program has provided care to patients by directly addressing the physical, cognitive and emotional concerns caused by the disease and treatment of cancer, both during and following acute cancer treatment, to strengthen a patient's return to full ability and enhance the patient's quality of life. The program meets the challenges facing modern cancer

fighters and survivors by coordinating physical medicine and rehabilitation interventions with acute oncologic care. RIC has and continues to work collaboratively with the renowned Robert H. Lurie Comprehensive Cancer Center of Northwestern University and many other major healthcare centers to ensure the continuity of patient care. This innovative approach delivers rehabilitation care during and after cancer treatment, on either an inpatient or outpatient basis, depending on patient needs. RIC cancer rehabilitation teams are led by a physiatrist and may include nurses, physical and occupational therapists, pain management specialists, speech-language pathologists, counselors and nutritionists specializing in working with cancer patients. RIC has offered specialized outpatient services such as its Cancer Rehabilitation Survivor Clinic, Lymphedema Clinic, and recreation and fitness therapy.

Chronic Pain. The RIC Center for Pain Management is an experienced, dedicated outpatient facility that serves as the cornerstone of RIC's chronic pain management services. The Center for Pain Management has and continues to provide comprehensive services to help and support people whose functional abilities have been diminished due to chronic pain. RIC offers services for individuals with neck and back pain, fibromyalgia, myofascial pain syndrome, neuropathic pain, complex regional pain syndrome (reflex sympathetic dystrophy), pain associated with rehabilitation diagnoses, and chronic headache. RIC connects patients to a rich network of community services, organizations, individuals and support groups that empower chronic pain survivors to share their experiences and connect with peers to improve their quality of life.

Ethics Consultations. Patients, family members and clinicians sometimes encounter situations that cause distress or conflict as they experience illness, impairment and disability. The ethics consultation process at RIC ensures everyone's concerns are heard, clarifies the acceptable range of treatment options, and suggests possible solutions. In FY 2015, for example, the Ethics staff conducted 51 formal clinical ethics consultations, responded to 53 ethics inquiries, and facilitated 4 case debriefings.

Neurological Rehabilitation. RIC's approach to neuro-rehabilitation encompasses both long and short-term rehabilitation. Treatment addresses sensory, motor, cognitive, and behavioral processing that impact functional performance in persons with central nervous system disorders. Services are offered for people with conditions such as multiple sclerosis, spasticity, and Parkinson's disease.

Pediatric Rehabilitation. RIC's Pediatric and Adolescent Rehabilitation Program has provided an experienced developmental approach to rehabilitation, which motivates through recreation and functional activities while improving skills.

Therapists use developmentally appropriate games, activities, sports and adaptive equipment to strengthen muscles; increase range of motion; and improve coordination, memory, attention span and daily living skills. Inpatient rehabilitation is, for many, the first step in treatment offering intensive therapy and medical care. Outpatient rehabilitation is appropriate for children who require fewer therapies. Other highlights from RIC's Pediatric and Adolescent Rehabilitation Program include the Adolescent Pain Management Program and Pediatric Feeding Support Services, which provide comprehensive, integrated assessments and recommendations for children with feeding difficulties.

Spinal Cord Injury Rehabilitation. RIC's Spinal Cord Injury Rehabilitation Program offers a comprehensive rehabilitative approach to build skills to accomplish patient goals and maximize patient independence. A patient's team of spinal cord injury experts is led by a physiatrist and may include nurses, clinical social workers, psychologists, occupational and physical therapists, speech-language pathologists, and other specialists. RIC therapists use state-of-the-art rehabilitation tools including body-weight supported treadmill training, robot-assisted walking therapy, and aquatic therapy in RIC's pool.

Spine and Sports Rehabilitation. The Spine and Sports Rehabilitation Center (SSRC) offers an integrated approach to rehabilitation, including physician services, on-site diagnostics and specially trained therapists who work together to Advance Human Ability™. The expert team of clinical specialists, led by a physician, specializes in spine, sports, and musculoskeletal (MSK) injuries. Rather than focus only on surgery, RIC physicians are trained to holistically explore non-surgical rehabilitation to provide patients better care with better outcomes. Conditions treated at SSRC include sports injuries, workplace and workers' compensation injuries, women's health, back problems (herniated discs, spinal stenosis, degenerative disc disease, sciatica, unspecified pain), and MSK injuries involving neck, ankle/foot, shoulder, and knee pain.

Stroke Rehabilitation. Hundreds of stroke patients come to RIC each year, including people from across the country and around the world, for expert physical medicine and rehabilitation. From the inpatient unit designed exclusively for the care and comfort of stroke patients, to the extensive team of physicians, nurses, therapists, and others who specialize in stroke rehabilitation, RIC combines the most advanced treatments and therapies that may help each individual patient achieve their goals. RIC physiatrists provide expert care to manage each patient's condition, help avoid complications that could impede progress, map out strategies to maximize recovery after a stroke, and help avoid a recurrence of stroke. Physical and occupational therapists and speech language pathologists work with patients individually and as a team to help address the unique effects of a stroke. Whether the goal is to help build strength and balance for better mobility; regain the skills of everyday activities;

enhance memory, understanding and communication; or recover the ability to speak and swallow, the team helps patients regain their independence and return to their communities. Rehabilitation nurses assist in medical management of stroke patients.

The RIC Prime of Life stroke rehabilitation program is specially designed for people with stroke whose multi-faceted and rigorous lives demand aggressive intervention. Often, those patients are younger and face greater demands, such as caring for a family, continuing a career or community involvement, engaging in an active social life, and enjoying intimate relationships. The RIC Prime of Life program integrates the traditional therapies and specialized services with other novel therapies not typically available elsewhere, including Constraint-Induced Movement Therapy, Robot-Assisted Walking Therapy, and Arm Therapy, Body Weight Supported Treadmill Training, Clinical Drug Therapy Trials, and Aphasia Management.

Vestibular Rehabilitation. Patients who come to RIC with a vestibular disorder may have a variety of symptoms. Common symptoms of a vestibular disorder include dizziness, vertigo, and imbalance. Patients may also experience nausea, hearing changes, anxiety, fatigue, and trouble concentrating. At RIC, patients with a vestibular disorder receive a thorough evaluation to determine the type of vestibular deficit and its effect on the patient's balance and quality of life. When the vestibular system has been affected due to one of the above conditions the brain cannot rely on the information it is receiving from the vestibular system. The patient's ability to maintain balance is now dependent on vision and signaling from muscles and joints. This can lead the patient to compensate for the change by avoiding various head positions and movements because these increase their symptoms. The avoidances help decrease the number of instances of dizziness and nausea but result in headache, muscle stiffness, fatigue, and decreased ability for the brain to adapt to the change in the vestibular system. Overall these avoidances make symptoms worse and increase the need for VRT. VRT at RIC includes gaze stabilization exercises, balance retraining exercises, and canal repositioning maneuvers.

Women's Health Rehabilitation. The Women's Health Rehabilitation Program at RIC is an outpatient care with six locations in and around Chicago. The program keeps up with changes women experience in their lives, helping to anticipate these changes and reducing the risks many women face later on. The RIC Women's Health Rehabilitation Program provides physical medicine and rehabilitation services for the specific health needs of women. The care of RIC focuses on pregnancy/post-partum, pelvic floor dysfunction, and breast cancer rehabilitation. Care teams at RIC also pay special attention to particular groups of women including adolescents, female athletes, and women with complex conditions. The physicians and therapists in RIC's Women's Health Rehabilitation program work with patients to determine the cause of their pain or difficulty with movement and to develop a treatment program to address patient needs. The program then works to empower patients to take back their lives

through manual physical therapy techniques, stretches, strengthening exercises and a range of other approaches available depending on patient needs.



Evaluating our Actions: Research at RIC

RIC's Research Program is the world's largest physical rehabilitation research enterprise in pursuit of clinical advancement through scientific discovery. The Research Program has at any given time approximately 300 research projects underway, funded by more than \$100 million in donations from both private and public sources. RIC conducts research in areas including aging, amputee, arthritis, basic science, biomedical, brain injury, cerebral palsy, clinical, gait, musculoskeletal, neuro-engineering, outcomes, pain, pediatrics, prosthetics and orthotics, robotics, spinal cord injury, sports medicine, stroke, and women's health. RIC carries a record eight research designations from U.S. government agencies, including the National Institute on Disability and Rehabilitation Research (NIDRR) and the National Institute for Health (NIH), to develop breakthrough treatments.

Computers and Robots in Therapy: An internationally acclaimed NIDILRR-funded center especially for patients with hemispheric stroke – the most debilitating kind. Seven studies address two elemental questions: When is the optimal time to use robotic and computer-based systems during therapy, and how do therapists best interact with robotic devices during therapy, often with minimal hands-on treatment coming from the clinician? Training of undergraduate rehabilitation engineers is included.

Manipulation and Mobility Technologies: A NIDILRR-funded Rehabilitation Engineering Research Center award to fund six new projects researching innovations that are directly useful for patients, especially those who have experienced limb-loss or stroke. Projects include body-powered hand prostheses, use of powered exoskeleton for after-stroke patients, and a new wheelchair to allow both sitting and standing. Research will include both technology development and clinical testing.

Health and Function in Physical Disability: This Rehabilitation and Training Center, funded by NIDILRR, was created to develop, evaluate, and implement methods to promote optimal health and function of people with physical disabilities. Through a variety of research, training and dissemination activities, we expect to gain a more comprehensive understanding of the efficacy and value of various interventions for achieving and maintaining health and function for people with a disability.

Neurologic Rehabilitation Research: RIC hosts one of six programs in the country within the National Center for Medical Rehabilitation Research awarded by the National Institutes of Health. Within this network of experts, RIC is the only one focused on the groundbreaking application of neural engineering and robotic

techniques to understand diagnose and treat such neurologic disorders as brain injury, multiple sclerosis and Parkinson's disease.



Spinal Cord Injury: RIC operates the Midwest Regional Spinal Cord Injury Care System as designated by NIDILRR. One of only 14 SCI Model Systems nationwide, RIC advances spinal cord care through clinical research that identifies new standards of care for the industry. It leads multiple independent and collaborative research projects exploring walking therapy technologies that deliver the most effective treatment to advance ability.

Engineering Research: Machines assist therapists in providing longer, more consistent and intensive therapies that track progress and improve functional

performance. RIC is designated one of 20 NIDILRR Rehabilitation Engineering Research Centers dedicated to stroke research and the only one focused on robotics.

Outcomes Research: RIC operates the only NIDILRR Outcomes Rehabilitation Research & Training Center in the nation leading the way for establishing global, standardized measures and evaluating clinical outcomes to ensure patients receive the best care and best outcomes.

Orthopedic Robotics for Kids: This grant from NIDILRR supports the research and development of innovative technologies to improve rehabilitative treatment for children with orthopedic disabilities, including cerebral palsy, clubfoot, brittle bone disease, spina bifida and spinal cord injury.

From 2013 to July 1 2016, RIC was awarded \$74.2 million dollars in multi-year research funding, to conduct research in rehabilitation and other areas of research that are specialties of RIC researchers. RIC's new research projects from 2013 to July 1, 2016 are listed in Appendix F, along with the RIC researcher who serves as the Principal Investigator of the research.

Additionally, RIC researchers have published hundreds of articles on a wide variety of rehabilitation-related topics from 2013 to 2016. Appendix G lists the names of articles where at least one RIC researcher was named as an author, along with the journal in which the article was published.

Evaluating our Actions: Improved Access to Information

As an addition to its world renowned clinical services, RIC developed the LIFE (Learning, Innovation, Family, Empowerment) Center in 2003 to address the range of emotional, interpersonal, physical and financial requirements for living with a disability. In response to the need for trusted resources in key areas of life, RIC provides this state-of-the-art multimedia education center and web portal as an integrated component of RIC patient care to support seamless and successful transitions throughout life.

In 2015, total outreach and service efforts represented 21,387 person contacts, an increase by 2,000 contacts from 2014. These included individualized patient, family, and community education programs, classes, special events, tours and a peer visit program. The Center's public computer area is consistently in high demand with over 7,000 visits for Internet use and support each year. The Center's impact spreads globally through its website. In 2015, the website drew 367,280 page views per month, reflecting 18,608 unique users per month, with 4,407,361 page views annually. Cumulative page views since its launch in 2003 have surpassed 34 million from 179 countries.



Evaluating our Actions: Education and Training

Medical Residency Program: The Department of Physical Medicine and Rehabilitation at Northwestern University's Feinberg School of Medicine (Dept of PM&R) is housed within RIC, which has one of the largest and most highly respected residency programs in physical medicine and rehabilitation in the country. Resident physicians spend three to four years rotating through the Dept of PM&R, taught by RIC physicians who are experts in this specialty. RIC trains about 40 residents each year. The RIC medical education program also provides opportunities for first-year medical students to meet regularly with patients from RIC's spinal cord injury, general rehabilitation, or pediatric program to gain patients' insights on recovery and needs for independent living.

Prosthetics and Orthotics (P&O) Residency: Each year, RIC's Prosthetics and Orthotics Clinical Center (POCC) selects two prosthetist and two orthotist residents for these highly sought after positions. In 2014, the prosthetics residency program was expanded to 18 months to allow additional hands-on experience in research through our Center for Bionic Medicine. To accommodate additional growth, our orthotics residency program will grow from two to three positions. Through the training programs, P&O residents are mentored by RIC's certified, licensed professionals and get exposure to a variety of clinical presentations and pathologies, clinical evaluation, prescription recommendation, documentation, the actual fabrication of devices, and formal research.

RIC Academy: For over 36 years, RIC has offered continuing education programming to help healthcare professionals stay at the forefront of their field. Each year, upwards of 1,000 students participate in Academy courses which are taught by interdisciplinary teams of recognized specialists from RIC and visiting experts from across the country and around the world. These courses are offered in a variety of formats including webinars, blended and on-site workshops, online courses and outreach programs. Healthcare professionals from outside of RIC participated 4,362 times in the 52 courses and 41 webinars that RIC offered from 2013 to June 2016. In 2016, we increased our online and on-demand offerings to allow us to reach even more professionals who can complete their learning at home, on their own time. The courses and conferences presented by the Academy from 2013-2015 are listed in Appendix E.

RIC Donnelley Ethics Program: RIC's Donnelley Ethics Program (DEP) is a resource for patients, families and RIC staff members and addresses such topics as decision-making capacity, informed consent and refusal, patient autonomy and self-determination, quality of life, disability rights and the integration of clinical care and research. The program is committed to creating an atmosphere that encourages

informed decision-making, value exploration, conflict resolution and evidence-based practice.

The DEP provides education for RIC staff, students throughout the Northwestern campus, and healthcare professionals across the country through inservices, courses, and presentations at national meetings. In FY 2015, the DEP created and delivered 17 clinical ethics in-services and 2 ethics webinars reaching approximately 545 people, in addition to 5 research ethics and 2 nursing ethics programs reaching approximately 194 people. The program also created and delivered a two-part course on “Negotiation Skill Building” led by a staff member with expertise in this area. 25 staff members participated in this workshop. The DEP continued to provide a lecture for 4th year medical students on their PM&R clinical rotation, and the Ethics team trains and assesses every PGY2 resident on a communication competency to have DNR conversations. Locally, DEP staff reached almost 1000 people with their educational efforts and many more through their presentation at national and international conferences.



Evaluating Our Actions: Support Programs

Transition programs for adolescent patients: Transition to adolescence presents unique challenges for patients in wheelchairs and other rehabilitation patients. Their changes in life circumstances include changes in school location (for instance, transitioning from a junior high to a high school), transitions from adolescence to adulthood (changes in puberty, sexual identity, increased abstract thinking, self-determination, increased responsibility). In an effort to help adolescent patients through the transition to adulthood, RIC operates a Youth Transition Program for adolescents ages 13-21 who have the potential for independent living and ability to direct their own care. The program focuses on providing social support and training in the areas of Cooking, Money Management, Community Transportation, Medical Information & Care, and Education and Employment.

Vocational Rehabilitation Program: Beginning a career or returning to work following an illness or injury is important to a patient's financial security and emotional well-being. It can contribute to the achievement of a productive, independent and fulfilling life. For 50 years, RIC has been providing comprehensive vocational rehabilitation services tailored to meet the needs of each client. Services include initial assessment, diagnostic evaluation, work trial assessments, job analysis, return-to-work evaluation, job placement, resume writing and interviewing workshops, an Internet job skills course and internship coordination. RIC covers the cost of initial assessments, which are not covered by most third-party payers. Patients receive vocational services at eight RIC facilities, ensuring that employment assistance is closely tied to community reintegration. During the past five years, the program has served an average of 900 clients annually.

Sports and Fitness Program: The RIC Adaptive Sports and Fitness Program provides wellness opportunities to people with physical disabilities through sports and recreation as well as a full-service accessible health club. All services offered in the adaptive sports program, which marked its 35th year in 2016, are free of charge. The fitness program, which celebrated its 20th anniversary, provides access to a health club that operates from 6:15 am to 7 pm five days per week for a nominal annual fee. The sports and fitness program is funded primarily by grants and generous community donations and is operated by ten and three quarter full time equivalent staff. Additionally, volunteers logged nearly 26,498 hours in 2015. RIC's well-established program is considered a national leader in health promotion for people with disabilities. In 2015, the sports program recorded 9,952 visits by its 303 registered participants, and the fitness program recorded 33,279 visits by its 775 registered participants. A separate program for youth, the Caring for Kids program, recorded 1,716 visits by 185 Chicago children with disabilities.

Assistive Technology Programs: Three areas – Rehabilitation Engineering, the Technology Center, and the Wheelchair & Seating Center – comprise RIC’s Assistive Technology Programs. In 2015, Assistive Technology Programs served more than 2,000 unique patients.

Rehabilitation Engineering staff provide evaluation, design and technical expertise to modify commercially available products and fabricate custom equipment, creating individualized solutions for people with disabilities. RIC provides free care for services or products, hosts engineering student internships, provides hands-on experiences to students through Northwestern University’s engineering design program and provides community-based workshops to disability groups about adaptive equipment, ergonomics and home safety.

The RIC Technology Center provides computer access training, augmentative communication devices and electronic aids to daily living for people with disabilities. Occupational therapists and speech language pathologists evaluate and recommend equipment for each individual’s needs. Through a lending library, patients can try items before purchasing them or borrow them for short-term use due to changing needs. Staff members speak to universities, schools, organizations for people with disabilities, senior centers and the general public. The center provides free service and home visits to clients who are unable to come to RIC.



How RIC Conducted This Assessment

A hospital facility’s report of the CHNA should describe the process and methods used to conduct the CHNA. Namely, the CHNA should: (1) describe the data and other information used in the assessment, as well as the methods of collecting and analyzing this data and information, and (2) identify any parties with whom the hospital facility collaborated, or with whom it contracted for assistance, in conducting the CHNA.⁸

1. Patient Conditions

RIC reviewed its patient mix by diagnostic group to determine the substantial health needs of its community. Figure 3 and Table 2 show RIC Patient Mix by Diagnostic Group for patients admitted on an inpatient basis and day rehabilitation patients.

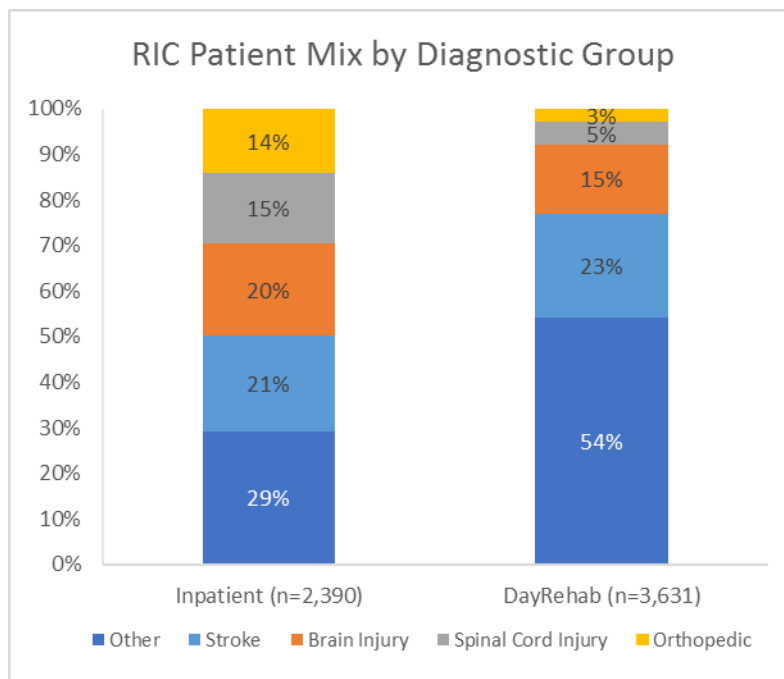


Figure 3. RIC Patient Mix by Diagnostic Group for Calendar Year 2015.

Diagnostic Group	Inpatient Total	Total as %	Day Rehab Total	Total as %
Stroke	501	21%	826	23%
Brain Injury	484	20%	550	15%
Spinal cord Injury	369	15%	179	5%
Orthopedic	337	14%	105	3%
Other	699	29%	1971	54%

Table 2. RIC Patient Mix by Diagnostic Group for Calendar Year 2015.

2. Literature Survey

Literature in the field of physical medicine and rehabilitation was reviewed to help determine the significant health needs of the community, with a focus on the types of conditions presented by RIC patients. Millions of individuals, including those in RIC's geographic community, have conditions that require physical medicine and rehabilitation services, such as traumatic brain injuries, stroke, cancer, and spinal cord injuries. Nationally, the number of patients who can benefit from rehabilitation is significant. Thanks to advances in research, new treatments, and early detection, survival rates of conditions in large patient populations such as stroke or cancer are steadily increasing. More people than ever before live through cancer – 11 million survivors in the United States alone, according to the American Cancer Society. Of the more than 795,000 people in the United States who have a stroke, more than 665,000 survive.⁹

Increased survival rates in populations suffering from conditions such as stroke and cancer bring new challenges and opportunities to the field of rehabilitation. For many cancer survivors, including those undergoing treatment, the aggressive, life-saving interventions may take a harsh toll on the human body. So while the fight against cancer is being won, patients may experience debilitating fatigue, pain, joint stiffness, weakness, emotional strain and limited mobility. Other problems may include swallowing difficulty, poor nutrition, skin breakdown, bowel and bladder dysfunction, and lymphedema, which are of key rehabilitation focus. Of all stroke patients, only one-third return to work. Of the two-thirds of stroke survivors who have had strokes and who do not return to work, many face long-term medical issues and other complications.

Traumatic Brain Injury

The U.S. Center for Disease Control (“CDC”) recognizes traumatic brain injuries (TBIs) as a significant health condition in the United States.¹⁰ 3.2 million–5.3 million persons in the United States have a TBI-related disability.¹¹ Physical rehabilitation is one method of mitigating the effects of TBI on sensory and motor systems and typically involves physiatrists, physical therapists, and occupational therapists. Physical rehabilitation has been shown to be effective in patient care, especially with an interdisciplinary team and an individualized plan of treatment when appropriate.¹² Vocational rehabilitation has also been shown to decrease reliance on public support and lead to positive employment outcomes.¹³

Stroke

Approximately 795,000 people experience a stroke annually in the United States.¹⁴ About 2.5% of the overall population in the United States have had a stroke. For individuals older than 75 years of age, the rate rises to 10.5%.¹⁵ Individuals below the

poverty level are at higher risk of having a stroke (4.7%) than are individuals in the overall population.¹⁶

One study notes that “Because improved acute intervention improves stroke survival and the increasing average age of US citizens imparts age-related stroke risk to a greater percentage of the population, the need for hospital-based rehabilitation care will also increase.”¹⁷

Cancer Rehabilitation

There were 13.8 million cancer survivors in the United States in 2010.¹⁸ One study estimated that up to 10% of cancer survivors may be appropriate for physical rehabilitation.¹⁹ Another study, of patients on the medical oncology floor of a Veterans Affairs hospital, notes that 87% of patients were identified as having rehabilitation needs.²⁰

One research study, conducted by RIC’s Chief Medical Officer and published in 2016, found that patients with functional limitations resulting from cancer or its treatment make significant functional gains in inpatient rehabilitation at RIC.²¹ Another study notes that “Comprehensive cancer rehabilitation programs are the exception rather than the rule in the United States. The vast majority of National Cancer Institute-designated cancer centers do not have comprehensive cancer rehabilitation programs” and further, that “Ideally, a comprehensive program would include a fellowship-trained cancer rehabilitation physician as well as physical and occupational therapists with experience in the functional restoration of cancer patients.”²²

Spinal Cord Injury

The number of people in the U.S. who are alive in 2016 and who have a spinal cord injury is estimated to be approximately 282,000 persons. Due to medical advances in the field, the average age at injury has increased, from 29 years during the 1970s to 42 years in 2016. Men account for approximately 80% of new spinal cord injury cases. Vehicle crashes are the leading cause of injury, followed by falls, acts of violence (primarily gunshot wounds), and sports/recreation activities.

Spinal cord injuries affect African-Americans disproportionately to their population in the United States. Figure 4 is reproduced from the National Spinal Cord Injury Statistical Center and indicates spinal cord injury by race/ethnicity. According to the NSCISC, “About 22% of injuries have occurred among non-Hispanic blacks since 2010, which is higher than the proportion of non-Hispanic blacks in the general population (12%).”²³

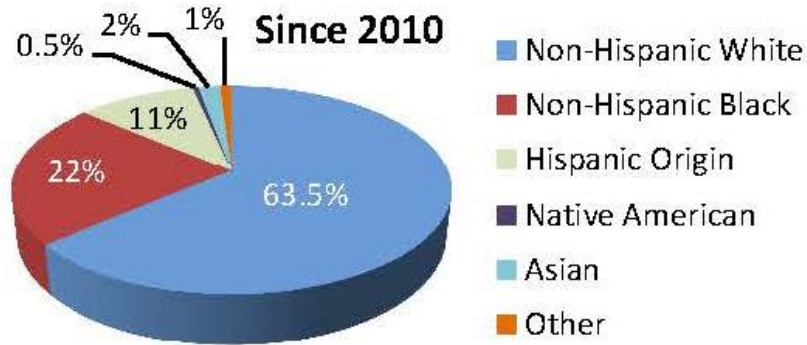


Figure 4. Spinal Cord Injury by Race/Ethnicity.

3. Public Health Departments

Representatives from RIC spoke with representatives of the Illinois Department of Public Health in April 2016 for IDPH’s input on the significant health needs of the community. IDPH representatives referenced their most recent Illinois Disability and Health Data Report, which addresses health status of adults with disabilities and children with special health care needs in Illinois. In preparing the report, IDPH uses a questionnaire with a pair of screening questions. One question inquires whether a respondent has an activity limitation due to physical, mental and/or emotional problems. Another asks if he or she used a mobility-device (e.g., cane, wheelchair) and/or other assistive devices (e.g., special bed or telephone). Survey participants who respond positively to either or both questions are labeled as “adults with disabilities.” 17.9% of adults in the Chicago metropolitan area were estimated to have a disability in 2013.²⁴ “The prevalence of disability increases across the age groups from 8.5 percent (95% CI: 6.8% – 10.7%) among young adults ages 18 to 39, to 21.5 percent (95% CI: 19.3% – 23.9%) among middle age adults ages 40 to 64, and to 35.1 percent (95% CI: 32.0% – 38.3%) among those ages 65 and older.”²⁵

According to the IDPH Report, Illinois adults with disabilities are more likely to face chronic disease than Illinois adults without disabilities. Table 3 compares disease rates for select chronic diseases.

	Adults with Disability	Adults without Disability
Arthritis	56.5%	16.1%
Asthma	19.6%	10.3%
Diabetes	22.3%	7.1%
Heart Attack	10.3%	2.8%
Chronic Obstructive Pulmonary Disease	14.0%	3.0%
Cancer	20.5%	7.7%

Table 3. Chronic Disease Prevalence ²⁶

Additionally, Illinois adults with disabilities are more likely to face risk factors for chronic diseases. Table 4 compares rates for select risk factors.

	Adults with Disability	Adults without Disability
Obesity	45.1%	25.9%
Participation in Exercise	61.7%	78.0%
Cigarette Smoking	24.3%	16.6%
High Blood Pressure	53.6%	24.9%
High Blood Cholesterol	51.3%	33.0%

Table 4. Risk Factor Prevalence ²⁷

The IDPH Report concludes:

Having a disability does not necessarily mean the lack of health or poor health. People with disabilities can benefit from disease prevention and health promotion efforts as much as those without disabilities. Because people with disabilities are at an increased risk of developing chronic health conditions, practicing disease prevention and health promotion may be more critical in maintaining health and continuing active life in the community.²⁸

RIC also reviewed data that had been prepared at the request of the Chicago Department of Public Health, which indicated that people with activity limitations face higher rates of obesity and lower rates of physical activity than people with no physical disabilities.

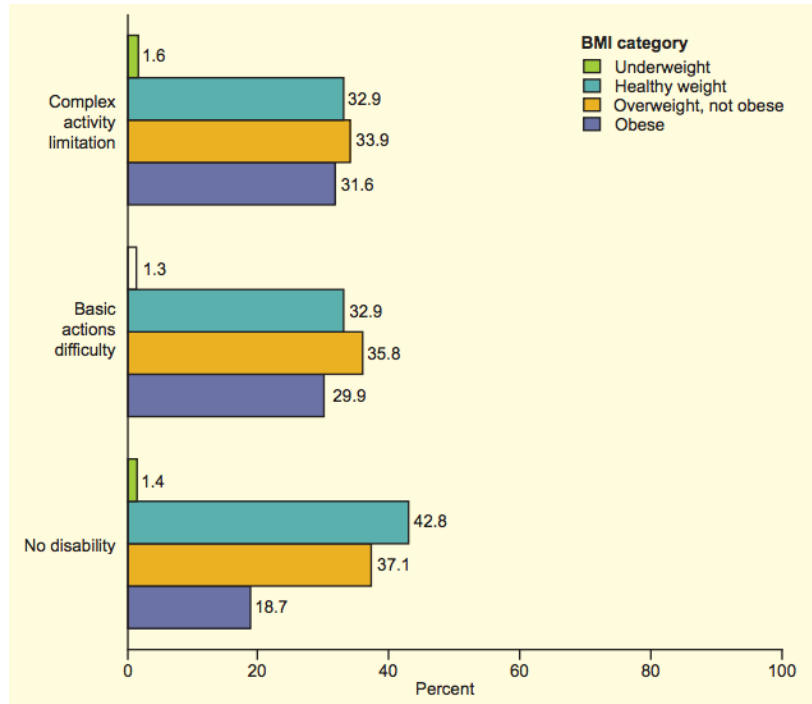


Figure 5. Higher Rates of Obesity.

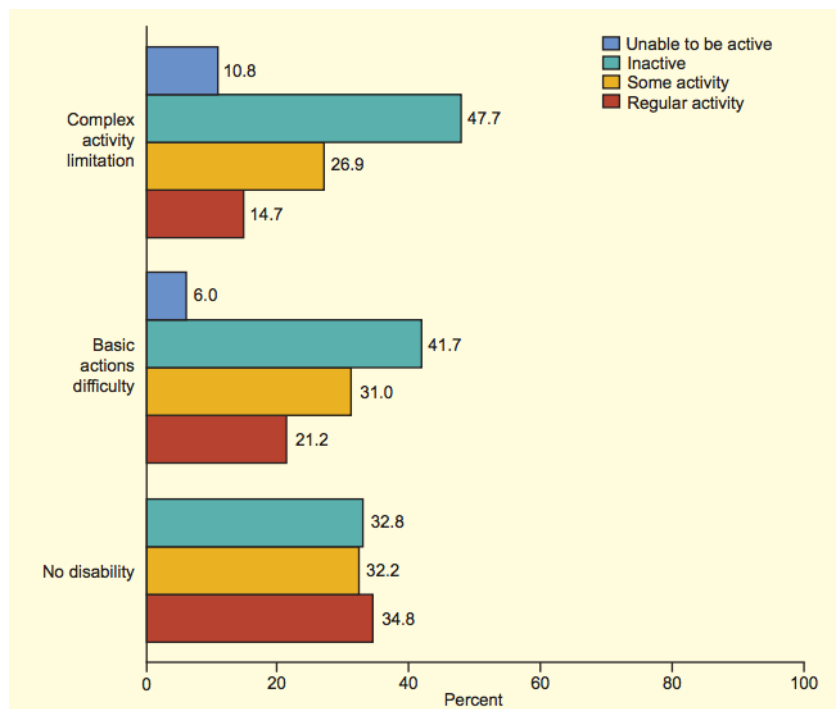


Figure 6. Lower Rates of Physical Activity

b. Consulting with Persons Who Represent the Broad Interests of the Served Community

RIC intentionally sought input from a wide variety of stakeholders who serve and represent the interests of medically underserved, low-income, and minority populations in the community. In May 2016, RIC hosted a focus group with leaders of the health community, as part of its effort developing the Assessment. Focus group participants included persons with special knowledge or expertise in public health, represented federal, state or local health departments, or agencies with current data or other information relevant to the health needs of the community. Participants also included leaders, representatives, or members of medically underserved, low-income, and minority populations and populations with chronic disease needs. Participants came from the organizations listed in Table 5:

Table 5. Focus Group Participant Organizations
Chicago Mayor's Office for Persons with Disability
Illinois DHS - Division of Rehabilitation Services
EOA Consulting, LLC.
Chicago Transit Authority
Chicago Park District
Extended Home Living Services
Brain Injury Association of Illinois
Spinal Cord Injury Association of Illinois
Parkinson's Disease & Movement Disorder Center at Northwestern University
Gridiron Alliance
RIC Peer Mentor Program

The external focus group was held at RIC and lasted over two hours. Group discussion focused on rehabilitation health needs of people with physical disabilities, access to information and care, research and clinical trials, education and training, and support programs. RIC also received comments from other community members who were unable to attend the focus group. A copy of the Focus Group presentation is included at Appendix A. Table 5 lists the individuals and organizations that RIC consulted with in preparing its Assessment. A detailed description of the

organizations invited by RIC to participate in its Assessment Focus Group is included at Appendix B.

RIC analyzed the information obtained in the Assessment process in order to identify the significant community health needs. Furthermore, focus group participants were asked to consider the significant rehabilitation health needs of their respective communities. Discussion focused on a broad array of condition groups, including stroke, spinal cord injury, brain injury (traumatic and non-traumatic), neuromusculoskeletal (Parkinson's disease, multiple sclerosis, joint replacements, sports injuries, arthritis, amputation, chronic pain), pediatric (congenital conditions, such as cerebral palsy, spina bifida and acquired conditions, such as traumatic brain injury, spinal cord injury, stroke, and amputation), and cancer.



The Identified Community Health Needs

A CHNA is intended to identify significant health needs and prioritize, and otherwise assess, the significant health needs identified. A hospital facility may determine whether a health need is significant based on all of the facts and circumstances present in the community it serves. In prioritizing significant health needs, a hospital facility may use as criteria the burden, scope, severity, or urgency of the health need; the estimated feasibility and effectiveness of possible interventions; the health disparities associated with the need; or the importance the community places on addressing the need. However, this list is not exclusive and a hospital facility may use any criteria it deems appropriate.²⁹

RIC reviewed the information it received from its literature survey, Illinois Department of Health, the Chicago Department of Health, the focus group, and its interviews, and matched that information against its current practices and goals for the hospital. As a result, RIC identified the following significant community health needs in the areas of Rehabilitation Health, Research, Improved Access to Information, Education and Training, and Support Programs. RIC prioritized the significant health needs on the basis of the health disparities associated with the injuries and other medical conditions treated at RIC, as well as the importance the community places on addressing the need.

A. Rehabilitation Health

RIC's Assessment identified the areas of stroke, spinal cord injury, brain injury, neuromusculoskeletal conditions, pediatric care, and cancer as continuing significant health needs.

B. Research and Rehabilitation Engineering

RIC's Assessment identified the continued need for rehabilitation research into new and more promising treatments to improve and eliminate the effects of injury, disease, and debilitating health conditions in the community RIC serves. New clinical spaces and models that better integrate research and clinical practice in real-time are key to making such research as effective for patients as possible.

Focus group participants also emphasized the need for rehabilitation engineering services. They particularly emphasized the need for RIC to provide specialized devices that assist in activities of daily living. One participant recalled a support system that attached to her wheelchair and allowed her to carry her new child. Another participant uses a stick that he moves with his mouth in order to type on his

smartphone and operate his wheelchair. Both of these technologies were built by RIC's rehabilitation engineering department.

C. **Improved Access to Information About Existing Resources**

The Assessment identified a continued need for access to information about existing resources and services for the community. In particular, the Assessment identified a need for the following specific kinds of information:

- Information about resources and opportunities post-discharge, such as information about community programs, vocational rehabilitation, and support groups. The timing of providing this information is an important factor. If it is provided at discharge, we heard that patients will set it to the side and forget it as they focus on more immediate post-discharge needs, such as medication management.
- Information about the LIFE Center, for patients who receive care from other rehabilitation facilities in the community.
- Information about emergency preparedness steps that patients can take when they return home.

D. **Education and Training**

The Assessment identified a continued need for training of patients and their families about the needs of individuals with disabilities. In particular, the Assessment identified a need for the following kinds of training for rehabilitation health professionals:

- Providing a psychiatry residency program to support the education needs of PM&R physicians.
- Developing continuing education programs for clinicians that highlight existing prevalence disparities as well as the difficulties patients with disabilities have in managing these chronic conditions. Such programs would additionally focus on how to connect patients to the right resources.

E. **Support Programs**

The Assessment identified a continuing need for support programs. In particular, it identified a need for the following kinds of support programs:

- Support programs for patients and their families.
- Accessible fitness programs.

Existing Resources

A CHNA must describe “the resources potentially available to address the significant health needs identified through the CHNA.”³⁰ These resources can include “organizations, facilities, and programs in the community, including those of the hospital facility.”³¹

There are 1,147 IRFs in the United States.³² RIC is approved for 242 inpatient beds by the Illinois Health Facilities Planning Board’s approval of RIC’s Certificate of Need on February 5, 2013 and has developed additional capacity as the need for the specialized expertise of RIC is required. Appendix C lists the IRFs in the Chicagoland and northwest Indiana region. Services at these sites of care may differ programmatically from those offered by RIC.

In addition to RIC’s Flagship Hospital, RIC operates multiple sites of care in the community for individuals who require outpatient or day rehabilitation treatment. A full list of RIC sites is included at Appendix D.

There are many informational resources available to patients with physical disabilities. More information may be found at RIC’s LIFE Center website, <http://lifecenter.ric.org>.



Citations

¹ Public Law 111148 (124 Stat. 119 (2010)).

² 26 CFR §1.501(r)-3(c).

³ 26 CFR §1.501(r)-3(b)(3).

⁴ *Id.*

⁵ *Id.*

⁶ *Case Mix Index*, CTRS. FOR MEDICARE & MEDICAID SERVS., available at <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Acute-Inpatient-Files-for-Download-Items/CMS022630.html> (last visited March 10, 2016).

⁷ 26 CFR §1.501(r)-3(b)(6)(i)(F).

⁸ 26 CFR §1.501(r)-3(b)(6)(ii).

⁹ *Stroke Facts*, CTRS FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/stroke/facts.htm> (last visited March 10, 2016).

¹⁰ Centers for Disease Control and Prevention. (2015). *Report to Congress on Traumatic Brain Injury in the United States: Epidemiology and Rehabilitation*. National Center for Injury Prevention and Control; Division of Unintentional Injury Prevention. Atlanta, GA.

¹¹ *Id.* at 19.

¹² *Id.* at 40-42.

¹³ *Id.* at 43.

¹⁴ <http://stroke.ahajournals.org/content/46/4/1038.full>

¹⁵ CDC, *Respondent-reported prevalence of heart disease, cancer, and stroke among adults aged 18 and over, by selected characteristics: United States, average annual, selected years 1997–1998 through 2013–2014*, at <http://www.cdc.gov/nchs/data/hus/2015/038.pdf> (last accessed June 14, 2016).

¹⁶ *Id.*

¹⁷ Brown, Measure of Functional Independence Dominates Discharge Outcome Prediction After Inpatient Rehabilitation for Stroke, at <http://stroke.ahajournals.org/content/46/4/1038.full> (last accessed June 14, 2016).

¹⁸ Stubblefield, M. D., Hubbard, G., Cheville, A., Koch, U., Schmitz, K. H. and Dalton, S. O. (2013), Current perspectives and emerging issues on cancer rehabilitation. *Cancer*, 119: 2170–2178. doi: 10.1002/cncr.28059 (available at <http://onlinelibrary.wiley.com/doi/10.1002/cncr.28059/full>) (last accessed May 27, 2016).

¹⁹ Maher J, McConnell H. *New pathways of care for cancer survivors: adding the numbers. Br J Cancer.* 2011;**105**(suppl 1):S5-S10.

²⁰ Mousas SB, Chang VT, Tunkel RS, Shah VV, Ryan LS, Millis SR. Rehabilitation needs of an inpatient medical oncology unit. *Arch Phys Med Rehabil* 2003;84:1642-1646 (cited in Sliwa et al, *Cancer Rehabilitation: Do Functional Gains Relate to 60 Percent Rule Classification or to the Presence of Metastasis?* *PM R* 8 (2016) 131-137.)

²¹ Sliwa et al, *Cancer Rehabilitation: Do Functional Gains Relate to 60 Percent Rule Classification or to the Presence of Metastasis?* *PM R* 8 (2016) 131-137

²² Stubblefield, M. D., Hubbard, G., Cheville, A., Koch, U., Schmitz, K. H. and Dalton, S. O. (2013), Current perspectives and emerging issues on cancer rehabilitation. *Cancer*, 119: 2170–2178. doi: 10.1002/cncr.28059 (available at <http://onlinelibrary.wiley.com/doi/10.1002/cncr.28059/full>) (last accessed May 27, 2016).

²³ National Spinal Cord Injury Statistical Center, Spinal Cord Injury (SCI) Facts and Figures at a Glance, at <https://www.nscisc.uab.edu/Public/Facts%202016.pdf>.

²⁴ <http://dph.illinois.gov/sites/default/files/publications/2013-datareport-7-13-15-final-042216.pdf> (page 13).

²⁵ <http://dph.illinois.gov/sites/default/files/publications/2013-datareport-7-13-15-final-042216.pdf> (pp. 8-9).

²⁶ <http://dph.illinois.gov/sites/default/files/publications/2013-datareport-7-13-15-final-042216.pdf> (pp. 15-21).

²⁷ <http://dph.illinois.gov/sites/default/files/publications/2013-datareport-7-13-15-final-042216.pdf> (pp. 22-31).

²⁸ *Id.* at 41.

²⁹ 26 CFR §1.501(r)-3(b)(4).

³⁰ 26 CFR §1.501(r)-3(b)(6)(i)(E).

³¹ 26 CFR §1.501(r)-3(b)(4).

³² *FY 2013 SSI Data/Rations for IRFs, CTRS FOR MEDICARE & MEDICAID SERVS.*, available at <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/InpatientRehabFacPPS/Downloads/ssiratio13.zip>.

RIC's Commitment to Non-Discrimination and Access

The Rehabilitation Institute of Chicago ("RIC") complies with applicable Federal civil rights laws and does not discriminate or treat people differently on the basis of race, color, national origin, age, disability or sex.

To ensure meaningful access to our services, RIC:

- Provides free aids and services to people with disabilities to communicate effectively with us, such as:
 - Qualified sign language interpreters
 - Information in alternative formats (e.g., large print, audio)
- Provides free language services to patients whose primary language is not English, such as:
 - Qualified interpreters
 - Information written in other languages

If you need these aids or services, please notify a member of your care team.

Complaints and Grievances

If you experience any difficulty in obtaining these aids or services, or you believe RIC has discriminated on the basis of race, color, national origin, age, disability, or sex, you can file a grievance with RIC's Director of the Donnelley Ethics Program, 345 E. Superior Street, Chicago, Illinois 60611, 312-238-1885 (tel), 312-238-8122 (fax). You can submit a grievance in person or by phone, mail, or facsimile. If you need help preparing a grievance, RIC's Director of the Donnelley Ethics Program is available to assist you.

You may also file a civil rights complaint with the U.S. Department of Health and Human Services, Office for Civil Rights, electronically through the Office for Civil Rights Complaint Portal, available at <https://ocrportal.hhs.gov/cor/portal/lobby.jsf>, or by mail or phone at:

**U.S. Department of Health and Human Services
200 Independence Avenue, SW
Room 509F, HHH Building
Washington, D.C. 20201
1-800-368-1019, 800-537-7697 (TDD)**

Language Assistance Services

Interpreter assistance is available upon request 24-hours a day and free of charge for all RIC patients. Ask any RIC staff member for assistance.

Español (Spanish)

ATENCIÓN: si habla español, tiene a su disposición servicios gratuitos de asistencia lingüística. Pida asistencia a cualquier empleado del RIC.

Polski (Polish)

UWAGA: Jeżeli mówisz po polsku, możesz skorzystać z bezpłatnej pomocy językowej. Po pomoc prosimy skontaktować się z dowolnym pracownikiem RIC.

繁體中文 (Chinese)

注意：如果您使用繁體中文，您可以免費獲得語言援助服務。如需援助，請聯繫任何RIC員工。

한국어 (Korean)

주의: 한국어를 사용하시는 경우, 언어 지원 서비스를 무료로 이용하실 수 있습니다. 언어 지원(통역)이 필요하시면, RIC 직원에게 알려 주십시오.

Tagalog (Tagalog – Filipino)

PAUNAWA: Kung nagsasalita ka ng Tagalog, maaari kang gumamit ng mga serbisyo ng tulong sa wika nang walang bayad. Para sa tulong, makipag-ugnayan sa sinumang kasamahan sa RIC.

العربية (Arabic)

ملحوظة: إذا كنت تتحدث العربية، فإن خدمات المساعدة اللغوية تتوافر لك بالمجان. للمساعدة، الرجاء التواصل مع اي من موظفي معهد شيكاغو لإعادة التأهيل

Русский (Russian)

ВНИМАНИЕ: Если вы говорите на русском языке, то вам доступны бесплатные услуги перевода. Для получения помощи, пожалуйста, свяжитесь с любым работником RIC.

ગુજરાતી (Gujarati)

સુચના: જો તમે ગુજરાતી બોલતા હો, તો નિ:શુલ્ક ભાષા સહાય સેવાઓ તમારા માટે ઉપલબ્ધ છે. સહાયતા માટે, કૃપા કરી કોઈપણ RIC સહયોગીને સંપર્ક કરો.

أردو (Urdu)

خبردار: اگر آپ اردو بولتے ہیں، تو آپ کو زبان کی مدد کی خدمات مفت میں دستیاب ہیں۔ معاونت کے لیے، براہ کرم کسی بھی RIC ایسوسی ایٹ سے رابطہ کریں۔

Tiếng Việt (Vietnamese)

CHÚ Ý: Nếu bạn nói Tiếng Việt, có các dịch vụ hỗ trợ ngôn ngữ miễn phí dành cho bạn. Để được giúp đỡ, vui lòng liên lạc với bất kỳ nhân viên nào của Viện phục hồi RIC.

Italiano (Italian)

ATTENZIONE: In caso la lingua parlata sia l'italiano, sono disponibili servizi di assistenza linguistica gratuiti. Per ottenere assistenza, rivolgersi a un dipendente della RIC.

हिंदी (Hindi)

ध्यान दें: यदि आप हिंदी बोलते हैं तो आपके लिए मुफ्त में भाषा सहायता सेवाएं उपलब्ध हैं। सहायता के लिए, कृपया कोई भी RIC सहयोगी को संपर्क करें।

Français (French)

ATTENTION : Si vous parlez français, des services d'aide linguistique vous sont proposés gratuitement. Pour obtenir de l'aide, veuillez contacter tout représentant du RIC.

λληνικά (Greek)

ΠΡΟΣΟΧΗ: Αν μιλάτε ελληνικά, στη διάθεσή σας βρίσκονται υπηρεσίες γλωσσικής υποστήριξης, οι οποίες παρέχονται δωρεάν. Για βοήθεια, παρακαλούμε επικοινωνήστε με οποιονδήποτε συνεργάτη της RIC.

Deutsch (German)

ACHTUNG: Wenn Sie Deutsch sprechen, stehen Ihnen kostenlos sprachliche Hilfsdienstleistungen zur Verfügung. Falls Sie Hilfe benötigen, wenden Sie sich bitte an einen Mitarbeiter von RIC.


Appendix A
RIC Assessment – Focus Group Presentation



Rehabilitation Institute of Chicago

FOCUS GROUP - COMMUNITY HEALTH NEEDS ASSESSMENT

May 3, 2016



Rehabilitation Institute of Chicago

INTRODUCTION

About RIC | Today's Purpose | RIC's Community

ABOUT THE REHABILITATION INSTITUTE OF CHICAGO (RIC)

- Founded in 1954
- Dedicated to excellence in providing the highest quality patient care, research, and education.
- RIC System includes 39 sites of care
 - Flagship Hospital, 345 E. Superior, Chicago
 - 182 inpatient beds
 - Outpatient services
- Ranked #1 Rehabilitation Hospital since 1991



Video – [History of RIC](#)



TODAY'S PURPOSE

- RIC 2016 Community Health Needs Assessment
 - Review of the significant health care needs that exist in RIC's community
 - Input from persons who represent the broad interests of the community served by the hospital
 - RIC will make its written assessment publicly available
 - Focus group agencies will be identified and their comments will be included
 - Comments will not be attributed to specific focus group members



THE COMMUNITY SERVED BY RIC

For this assessment,
RIC's community is:

“Individuals in Chicago and the surrounding area with a need for inpatient, outpatient, or day rehabilitation physical medicine and rehabilitation.”



FOCUS GROUP STAKEHOLDERS

- Persons with special knowledge of or expertise in public health
- Governmental health or other departments or agencies
- Leaders, representatives, or members of medically underserved, low-income, and minority populations
- Leaders, representatives, or members of populations with chronic disease needs





RESULTS FROM 2013 ASSESSMENT

Significant Health Needs Identified | Progress Report



SIGNIFICANT HEALTH NEEDS IDENTIFIED IN 2013

1. Rehabilitation Health Needs
2. Research
3. Improved Access to Information
4. Education and Training
5. Support Programs



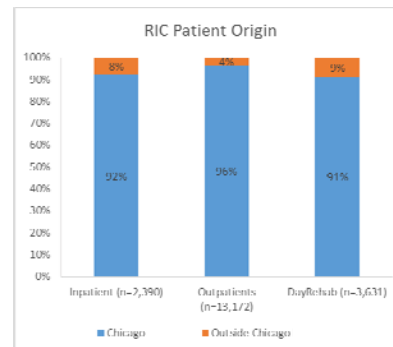
1. REHABILITATION HEALTH

- Brain Injury rehabilitation
 - Traumatic and non-traumatic
- Spinal Cord Injury rehabilitation
- Stroke rehabilitation
- Neuro-musculoskeletal rehabilitation
 - Parkinson's Disease, Multiple Sclerosis, Joint Replacements, Arthritis, Amputation, Chronic Pain
- Pediatric rehabilitation
 - Congenital conditions, i.e. Cerebral Palsy, Spina Bifida
 - Acquire conditions, i.e. TBI, SCI, Stroke, Amputation
- Cancer rehabilitation



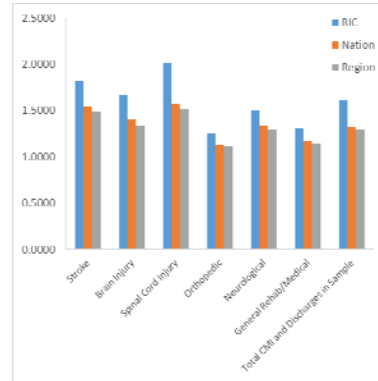
REHABILITATION HEALTH – PROGRESS REPORT

- RIC continues to be ranked the #1 Rehabilitation Hospital.
- Since 2013, RIC has treated more than 6,400 inpatients through its system of care and delivered over a million outpatient therapy units each year. This chart shows patients in 2015.



REHABILITATION HEALTH – PROGRESS REPORT

- RIC provides care to patients who are more medically complex than the average patient receiving care at a rehabilitation facility.
- The chart to the right shows Case Mix Index (“CMI”) values of RIC patients in 2015, compared to patients seen nationally and patients seen regionally.
- The CMI value is a measure of objectively determining a patient’s medical complexity.



2. RESEARCH

- RIC’s 2013 Assessment identified the continued need for rehabilitation research into new and more promising treatments to help patients and others in RIC’s community have improved health outcomes.
- The impact of RIC’s research programs is national in scope, building on the Searle Center’s mission of helping people with disabilities gain as independent and fulfilling life as possible.

RESEARCH – PROGRESS REPORT

- RIC now has eight research designations from U.S. government agencies:
 1. Health and Function in Physical Disability
 2. Neurologic Rehabilitation
 3. Spinal Cord Injury
 4. Engineering Research
 5. Outcomes Research
 6. Orthopedic Robotics for Kids
 7. Manipulation and Mobility Technologies
 8. Computers and Robots in Therapy



RESEARCH – PROGRESS REPORT

At any given time, RIC has approximately 300 research projects underway, funded by more than \$100 million in donations from both private and public sources.

One example, published in the Journal of the American Medical Association: *Intuitive Control of a Powered Prosthetic Leg During Ambulation: A Randomized Clinical Trial*. Hargrove LJ, Young AJ, Simon AM, et al. JAMA. 2015; 313(22):2244-2252. ([Video 1](#)) ([Video 2](#))



RESEARCH – PROGRESS REPORT

- RIC has continued to build its new research hospital that is scheduled to open in March 2017.
- The new hospital will have 242 beds – a 33% increase over our current capacity.
- Five Innovation Centers
 - Brain
 - Spinal Cord
 - Nerve, Muscle & Bone
 - Pediatric
 - Cancer
- [Advancing Human Ability at RIC](#)



3. ACCESS TO INFORMATION

- The 2013 Assessment identified a continued need for access to information about existing resources and services for the community.
- The needs include education and peer support to patients and their families during and after hospitalization.



ACCESS TO INFORMATION – PROGRESS REPORT

- The LIFE Center
 - In 2015, total outreach and service efforts represented 21,386 person contacts, an increase by 2,000 contacts from 2014.
 - The Center's public computer area is consistently in high demand with over 7,000 visits for Internet use and support each year.
 - In 2015, the website drew 367,280 page views per month, reflecting 18,608 unique users per month, with 4,407,361 page views annually.



4. EDUCATION AND TRAINING

- The Assessment identified a continued need for education and training of medical providers, patients, and their families.
- Since 2013, RIC has continued to support its education and training programs for these populations in the community.



EDUCATION AND TRAINING

- RIC's Life Center
- **Physiatry Residency Program:**
 - RIC trains about 40 residents each year and medical students meet regularly with our patients.
- **Prosthetics and Orthotics Residency Program:**
 - Each year, RIC's Prosthetics and Orthotics Clinical Center (POCC) selects two prosthetist and two orthotist residents. In 2014, the prosthetics residency program was expanded to 18 months to allow additional hands-on experience in research through RIC's Center for Bionic Medicine.
- **RIC Academy:**
 - Each year, upwards of 1,000 students participate in RIC Academy courses which are taught by interdisciplinary teams of recognized specialists from RIC and visiting experts from across the country and around the world.



5. SUPPORT PROGRAMS

- The Assessment identified a continued need for:
 - transition programs for adolescent rehabilitation patients and their families.
 - Accessible and integrated fitness programs, with trained staff
- Since 2013, RIC has continued to support its education and training programs for these populations in the community.



SUPPORT PROGRAMS – PROGRESS REPORT

- During the past five years, the Vocational Rehabilitation program has served an average of 900 clients annually.
- In 2015, Assistive Technology Programs served more than 2,000 unique patients.
- In 2015, the Sports program recorded 9,952 visits by its 303 registered participants, and the Fitness program recorded 33,279 visits by its 775 registered participants.




SUPPORT PROGRAMS – PROGRESS REPORT

- “Transitions Planning Program for Adolescents” addresses five skill areas that focus on independence and caregiver involvement.




- “Caring for Kids” program builds social interaction skills for children. Recorded 1,716 visits by 185 Chicago children with disabilities.





BREAK
10 minute restroom break



2016 SIGNIFICANT HEALTH NEEDS
Background | Your Input



INITIALLY IDENTIFIED SIGNIFICANT HEALTH NEEDS

- The significant health needs that likely will continue to be significant health needs for its community:
 1. Rehabilitation Health Needs
 2. Research
 3. Access to Information
 4. Education and Training
 5. Support Programs



YOUR INPUT AS COMMUNITY MEMBERS

- RIC wants to hear from you regarding these needs, as well as regarding other health care needs for the community you believe are significant
- RIC's community: "Individuals in Chicago and the surrounding area with a need for inpatient, outpatient, or day rehabilitation physical medicine and rehabilitation"



1. REHABILITATION HEALTH NEEDS

- Brain Injury rehabilitation
 - Traumatic and non-traumatic
- Spinal Cord Injury rehabilitation
- Stroke rehabilitation
- Neuro-musculoskeletal rehabilitation
 - Parkinson's Disease, Multiple Sclerosis, Joint Replacements, Arthritis, Amputation, Chronic Pain
- Pediatric rehabilitation
 - Congenital conditions, i.e. Cerebral Palsy, Spina Bifida
 - Acquire conditions, i.e. TBI, SCI, Stroke, Amputation
- Cancer rehabilitation



1. REHABILITATION HEALTH NEEDS

- Based on your experience with these health conditions, what do you find to be the rehabilitation health needs of individuals with these conditions?
 - Brain injury
 - Spinal cord injury
 - Stroke
 - Neuro-muscular
 - Pediatric (Cerebral Palsy, Spina Bifida, acquired conditions)
 - Cancer rehabilitation
- How well do health organizations in the community meet these needs?



2. RESEARCH

Based on your knowledge and work with your communities,

- Are they aware of research studies available to them?
- Do they have the opportunity to participate in research studies?
- Have you identified barriers that prevent individuals from participating in research?
- Are there specific areas of research you believe would benefit the community



3. ACCESS TO INFORMATION

- What has been your experience in using consumer and/or family resource centers?
- Based on your experience how well do resource centers meet the rehabilitation needs of the community?
- Are there any additional resources RIC should consider including in the LIFE Center?



4. EDUCATION AND TRAINING

- Is there specific education or training that a provider of physical medicine and rehabilitation could provide which would benefit the community:
 - For health care providers?
 - For patients?
 - For their families?
 - For your organizations?



5. SUPPORT PROGRAMS

Based on your knowledge and work with your communities, are they aware of and can they access:

- Vocational rehabilitation programs?
- Assistive technologies?
- Sports and fitness programs?



OTHER SIGNIFICANT HEALTH NEEDS

- Do you have any other recommendations or suggestions regarding the significant health needs of RIC's community in light of RIC's particular expertise?



CONCLUSION

Closing Remarks | Thank You!



Appendix B

Consulted Organization Descriptions

The following organizations were invited to participate in the focus group RIC conducted as part of its Assessment. The descriptions below were provided by each organization.

Organization	Organization Descriptions
Chicago Mayor's Office for Persons with Disability	The Mayor's Office for People with Disabilities (MOPD) works to meet the diverse needs of the more than 600,000 individuals with disabilities who live and work in Chicago. MOPD's goal is to make Chicago the most accessible city in the nation. MOPD serves five major groups: people with disabilities, City departments and agencies, other government agencies, disability-related agencies, and organizations and the private sector.
Illinois DHS - Division of Rehabilitation Services	The Illinois Department of Human Services' Division of Rehabilitation Services is the state's lead agency serving individuals with disabilities. DRS works in partnership with people with disabilities and their families to assist them in making informed choices to achieve full community participation through employment, education, and independent living opportunities.
EOA Consulting, LLC.	
Chicago Transit Authority	The CTA operates the nation's second largest public transportation system and covers the City of Chicago and 35 surrounding suburbs.
Chicago Park District	The Chicago Park District owns more than 8,100 acres of green space, making it one of the largest municipal park managers in the nation. The Chicago Park District's 580 parks offer thousands of sports and physical activities as well as cultural and environmental programs for youth, adults, and seniors. The Chicago Park District is also responsible for 26 indoor pools, 51 outdoor pools, and 26 miles of lakefront including 23 swimming beaches plus one inland beach. From canoeing to batting cages to arts

	and crafts, there is never a shortage of activities to participate in Chicago's parks.
Extended Home Living Services	Since 1991, EHLS has served as a leading home modification vendor. They provide free in-home assessment and itemized proposal of changes for people with physical disabilities. Products and services include: grab bars, customized ramps, wheelchair lifts, stair lifts, bath & kitchen modifications, roll-in-showers, modified door openings, room additions, and new accessible homes. In addition, the company helps customers find funding sources for necessary home enhancements.
Brain Injury Association of Illinois	The Brain Injury Association of Illinois (BIA of IL) is a not-for-profit, statewide membership organization comprised of people with brain injuries, family members, friends, and professionals. BIA of IL is part of a network of brain injury associations across the United States, and is a subsidiary of the national Brain Injury Association, Inc. (BIA) which was founded in 1980. The BIA of IL is the only organization in Illinois serving individuals with TBI, their families and professionals who treat them and is dedicated to providing information, advocacy, and support.
Spinal Cord Injury Association of Illinois	Spinal Cord Injury Association of Illinois is a 501(c)3 non-profit organization providing information and support resources for people paralyzed by trauma and medical conditions, family members, and health care and related professionals that serve the SCI community.
Parkinson's Disease & Movement Disorder Center at Northwestern University	Northwestern University Parkinson's Disease and Movement Disorders Center conducts research to extend the knowledge and treatment of PD and other movement disorders. Additionally, it provides innovative, multidisciplinary care for patients and families affected.
Gridiron Alliance	The mission of the Gridiron Alliance is twofold: 1) Provide essential outreach to high school student

	<p>athletes catastrophically injured in school sports, and 2) Prevent future injuries to all student athletes by making school sports as safe as they can be. To accomplish this mission, the Alliance will provide outreach and prevention initiatives. The Gridiron Alliance recognizes that school sports-related injuries have and will occur. The impact of catastrophic injuries on the young athletes and their families can be emotionally, physically, and financially devastating. Through outreach and educational programs, the Gridiron Alliance helps injured athletes and their families adjust to and meet the extraordinary challenges they face in the weeks, months, and years after the onset of the injury. The Gridiron Alliance has enlisted as leaders and mentors athletes who became paralyzed as a result of high school football injuries. The Alliance maintains strong relationships with the NFL and other professional and paraprofessional outreach programs.</p>
<p>RIC Peer Mentor Program</p>	<p>The Peer Visitor Program connects newly injured inpatients at RIC with people who have had a similar injury and are now living with their disabilities. A peer visitor is a valuable resource not only to the newly disabled individual, but to the family and friends of the individual, as well as the staff at RIC.</p> <p>The goal of peer counseling is to help people with disabilities regain autonomy and achieve self-determination by providing them with the tools and resources that will enable them to live more independent, productive, satisfying lives. The program also offers them the opportunity to connect to the larger community of people with disabilities and those who are dealing with similar issues.</p>

Appendix C

Chicagoland and Northwest Indiana Inpatient Rehabilitation Facilities

Chicagoland Hospital	City	County	Licensed Rehabilitation Beds
Adventist La Grange Hospital	La Grange	Cook	16
Advocate Christ Medical Center	Oak Lawn	Cook	37
Advocate Illinois Masonic MC	Chicago	Cook	22
Advocate Lutheran General Hosp	Park Ridge	Cook	45
Alexian Brothers Medical Center	Elk Grove Village	Cook	72
Centegra Northern Illinois Medical Ctr	McHenry	McHenry	22
Evanston Hospital	Evanston	Cook	22
Holy Cross Hospital	Chicago	Cook	34
Ingalls Memorial Hospital	Harvey	Cook	46
Louis A Weiss Memorial Hospital	Chicago	Cook	26
Loyola University Med Center	Maywood	Cook	32
MacNeal Hospital	Berwyn	Cook	12
Marianjoy Rehabilitation Hospital	Wheaton	DuPage	100
Mercy Hospital & Medical Center	Chicago	Cook	24
Northwest Community Hospital	Arlington Heights	Cook	17
Presence Saint Joseph Hospital	Elgin	Kane	40
Presence Saint Joseph Medical Center	Joliet	Will	32
Rehabilitation Institute of Chicago	Chicago	Cook	182
Resurrection Medical Center	Chicago	Cook	65
Riverside Medical Center	Kankakee	Kankakee	25
Rush Oak Park Hospital	Oak Park	Cook	36
Rush University Medical Center	Chicago	Cook	59
Rush-Copley Medical Center	Aurora	Kane	18
Saint Joseph Hospital	Chicago	Cook	23
Saint Mary and Elizabeth Medical Center	Chicago	Cook	15
Schwab Rehabilitation Hospital	Chicago	Cook	81
Shriners Hospital for Children	Chicago	Cook	6
Silver Cross Hospital	New Lenox	Will	25
St James Hospital & Health Center	Chicago Heights	Cook	30
Swedish Covenant Hospital	Chicago	Cook	25
University of IL MC at Chicago	Chicago	Cook	18
Vista Medical Center West	Waukegan	Lake	25
Westlake Hospital	Melrose Park	Cook	28

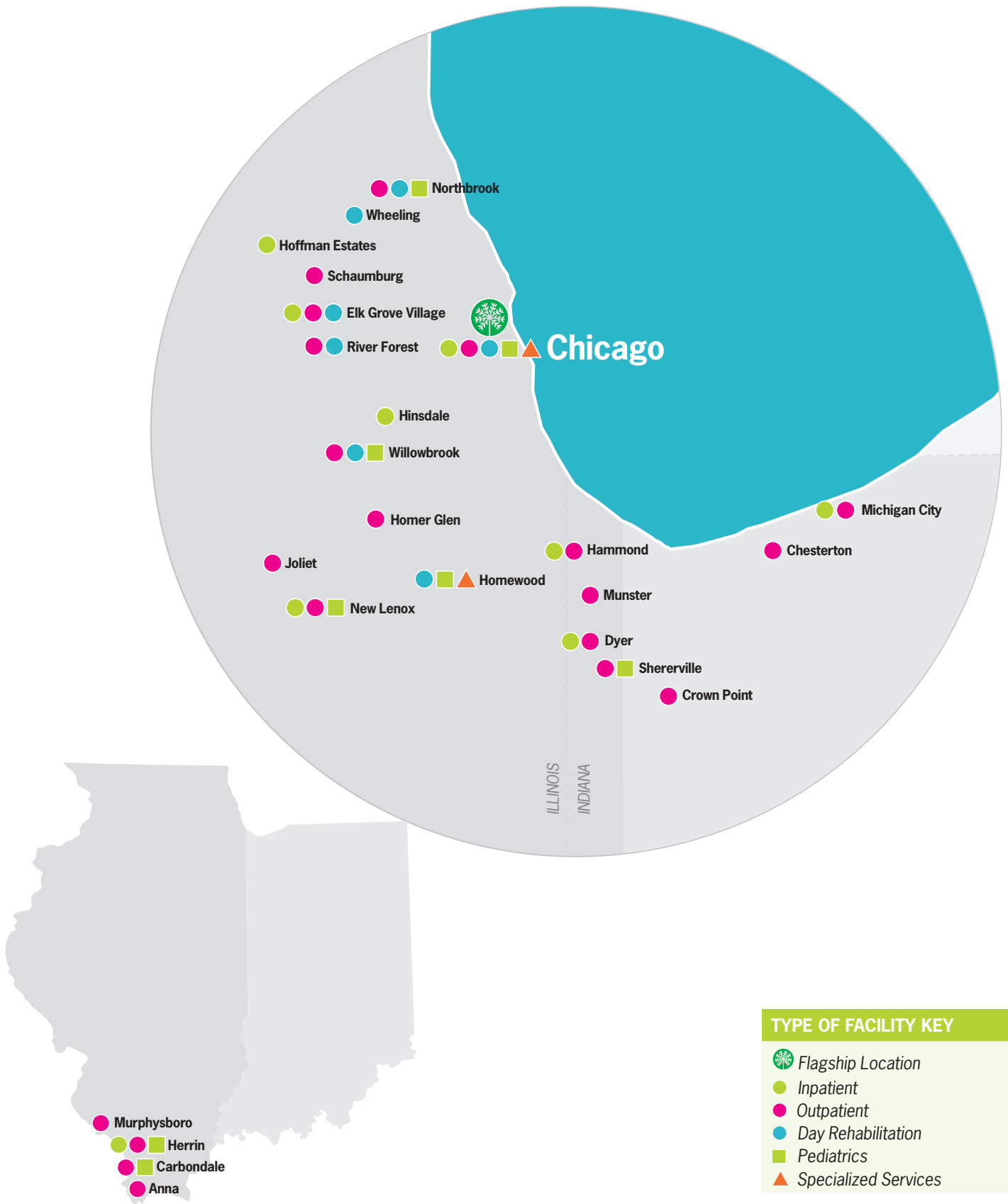
Source: Illinois Hospital Association, based on licensed beds per Illinois Department of Public Health; January 2016. The chart includes IRFs in the Cook, Dekalb, Dupage, Kane, Kankakee, Lake, McHenry, and Will counties. <https://www.ihatoday.org/uploadDocs/1/capacityhosp.pdf>

Northwest Indiana Hospital	City	County	Licensed Rehabilitation Beds
Community Hospital of Munster	Munster	Lake, IN	40
Methodist Hospitals - Northlake	Gary	Lake, IN	15
Methodist Hospitals - Southlake	Merrilville	Lake, IN	11
St. Anthony Medical Center	Crown Point	Lake, IN	20
St. Catherine Hospital	East Chicago	Lake, IN	18
St. Margaret Mercy North Campus	Hammond	Lake, IN	18
St. Margaret Mercy South Campus	Dyer	Lake, IN	12
St. Mary Medical Center - Hobart	Hobart	Lake, IN	20
Porter Memorial Hospital- Portage Campus	Portage	Porter, IN	11

Source: Indiana Hospital Association and Indiana Department of Public Health; based on licensed beds per CMS; as of February 2009. This chart includes IRFs in the Lake and Porter counties.

Appendix D
RIC Sites of Care

ALL LOCATIONS



TYPE OF FACILITY KEY

-  Flagship Location
-  Inpatient
-  Outpatient
-  Day Rehabilitation
-  Pediatrics
-  Specialized Services

ALL RIC LOCATIONS BY CITY



FLAGSHIP LOCATION

- ▲ **Rehabilitation Institute of Chicago (RIC)**
345 East Superior Street, Chicago, IL
312-238-1000
▲ *Donnelly Ethics Program, LIFE Center, Motion Analysis Center, Prosthetics and Orthotics Center, Pulmonary Rehabilitation, Technology Center, Rehabilitation Engineering*
- *Outpatient Therapy (Allied Health)*
- *Pediatric Outpatient Therapy*

ILLINOIS

- **Anna / RIC at Rehab Unlimited**
515 East Vienna Street, Suite I, Anna, IL
618-833-1506
- **Carbondale / RIC at Rehab Unlimited (a service of Memorial Hospital of Carbondale)**
305 West Jackson Street, Suite LL01, Carbondale, IL
618-549-0721 ext. 65741
- **Chicago / RIC at Advocate Illinois Masonic Medical Center and Outpatient Services**
836 West Wellington Avenue, Chicago, IL
773-296-7450
- **Chicago / RIC Center for Pain Management**
980 North Michigan Avenue, Suite 800, Chicago, IL
312-238-7800
- **Chicago / RIC DayRehabCenter® at Ravenswood in affiliation with Advocate Illinois Masonic**
1945 West Wilson Avenue, Suite 100, Chicago, IL
773-290-6616
- **Chicago / RIC DayRehabCenter® at River North**
307 West Grand Avenue, Chicago, IL
312-238-6850
- ▲ **Chicago / RIC Health & Fitness Center (Mezzanine Level) and RIC Vocational Rehabilitation Center**
541 North Fairbanks, Chicago, IL
312-238-6800
- **Chicago / RIC Spine and Sports Rehabilitation Center**
1030 North Clark Street, Suite 500, Chicago, IL
312-238-7767
- **Elk Grove Village / Alexian Rehabilitation Hospital (RIC Outpatient/DayRehab®, Inpatient and Outpatient RIC Physician Practice)**
935 Beisner Road, Elk Grove Village, IL
847-640-5600
- **Herrin / Fit For Work, RIC at Herrin Hospital**
100 South Park Avenue, Herrin, IL
618-942-3088
- **Herrin / RIC at Herrin Hospital and Rehab Unlimited (Acute Rehabilitation Center)**
201 South 14th Street, Herrin, IL
618-942-2171 ext. 35433
- **Herrin / RIC Psychiatry Clinic in affiliation with Southern Illinois Healthcare**
3224 S. Park, Herrin, IL
618-351-4980

- **Hinsdale / RIC at RML Specialty Hospital**
5601 South County Line Road, Hinsdale, IL
630-286-4246
- **Hoffman Estates / RIC at St. Alexius Medical Center**
1555 Barrington Road Hoffman Estates, IL
847-956-5422
- **Homer Glen / RIC at Silver Cross Health Center**
12701 West 143rd Street, Homer Glen, IL
815-300-6288
- ▲ **Homewood / RIC Prosthetics and Orthotics Center and DayRehabCenter®**
1055 West 175th Street, Suite 101, Homewood, IL
708-957-8326
- **Joliet / RIC at Silver Cross Hospital**
1051 Essington Road, Joliet, IL
815-300-6580
- **Murphysboro / RIC at Rehab Unlimited, St. Joseph Memorial Hospital**
6 East Shawnee Drive, Murphysboro, IL
618-684-8018
- **New Lenox / RIC at Silver Cross Hospital**
1890 Silver Cross Boulevard, New Lenox, IL
815-300-7110
- **New Lenox / RIC at Silver Cross Professional Building**
250 East Maple Street, New Lenox, IL
815-300-6123
- **Northbrook / RIC DayRehabCenter® and Outpatient Center, Northshore**
755 Skokie Boulevard, Suite 175, Northbrook, IL
847-272-7426
- **Northbrook / RIC Outpatient Center, Northshore (annex)**
900 Skokie Boulevard, Northbrook, IL
847-272-7426
- **River Forest / RIC Spine and Sports Rehabilitation Center**
420 Thatcher Avenue, River Forest, IL
708-427-3650
- **Schaumburg / RIC at the St. Alexius Outpatient Center**
347 West Golf Road, Schaumburg, IL
847-490-6928
- **Wheeling / RIC DayRehabCenter®**
5150 Capitol Drive, Wheeling, IL
847-215-9977
- **Willowbrook / RIC DayRehabCenter® and Outpatient Center**
6705 South Kingery Highway, Willowbrook, IL
630-388-6700

INDIANA

- **Chesterton / RIC at Franciscan OMNI Health & Fitness**
810 Michael Drive, Chesterton, IN
219-395-2013
- **Crown Point / RIC at Franciscan Alliance, Cherry Creek Physical Therapy**
7310 West Lincoln Highway, Crown Point, IN
219-322-4673
- **Crown Point / RIC at Franciscan Point**
12800 Mississippi Parkway, Crown Point, IN
219-681-6700
- **Dyer / RIC at Franciscan St. Margaret Mercy Health**
24 Joliet Street, Dyer, IN
219-865-2141
- **Hammond / RIC at Franciscan St. Margaret Mercy Health**
5454 Hohman Avenue, Hammond, IN
800-886-5437
- **Michigan City / RIC at Franciscan St. Anthony Health**
301 West Homer Street, Michigan City, IN
219-877-1613
- **Michigan City / RIC at Franciscan St. Anthony, Coolspring Health Center**
1225 East Coolspring Avenue, Michigan City, IN
219-861-8121
- **Michigan City / RIC at Franciscan St. Anthony, Woodland Health Center**
8865 West 400 North, Michigan City, IN
219-872-2923
- **Munster / RIC at Franciscan Hammond Clinic Physical Therapy**
9800 Valparaiso Drive, Munster, IN
219-934-9800
- **Schererville / RIC at Franciscan St. Margaret Mercy Health, OMNI Health & Fitness**
221 US Route 41, Schererville, IN
219-322-1600
- **St. John / RIC at Franciscan St. John Medical Center (Coming Soon)**
10860 Maple Lane (Parrish & Rt. 231)
St. John, IN 46373
219-558-8102

TYPE OF FACILITY KEY

- Flagship Location
- Inpatient
- Outpatient
- Day Rehabilitation
- Pediatrics
- ▲ Specialized Services

Appendix E

Academy Courses and Conferences

The RIC Academy provided the following courses and conferences in 2013, 2014, and 2015, to address education and training needs in the areas of physical medicine and rehabilitation.

2013

- Neurologic Upper Extremity: Function and Management
- 36th Annual Interdisciplinary Spinal Cord Course
- Therapeutic Interventions in Neurorehabilitation
- Pediatric Gait Analysis: A Segmental Kinematic Approach to Orthotic Management
- Vestibular Rehabilitation: Theory, Evidence and Practical Application
- Neuroscience Applications to Treatment of Attention and Memory Disorders
- Management of the Neurologic Upper Extremity, with Focus on the Hand: an Evidence Based Approach and Practical Solutions
- Practical Stroke Rehabilitation Care: Staying on the Cutting Edge
- Neuroanatomy: A Practical Review for Clinicians
- Cervical Spine Symposium
- Kinetic Chain Evaluation and Functional Exercise Approaches
- Update on Intervention for Cognitive-Communication Disorders in Adolescents and Adults with Acquired Brain Injury
- From Dysphagia to Eating/Dining: Rehabilitation and Sustainability for Adults
- Neuroscience Applications to Clinical Practice
- Walk the Walk: Locomotor Training in Neurorehabilitation in Patients with Stroke or Incomplete Spinal Cord Injury
- New Directions for Understanding Whiplash - Have We Been Driving in the Wrong Lane?
- Evidence-Based Solutions for Improving Cervical Spine Health and Function
- Behavior Modification Strategies for Individuals with Traumatic Brain Injury
- Future Trends in Rehabilitation and Technology in Traumatic Brain Injury
- Impairments in Executive Functioning: Implications for Rehabilitation
- Female Athlete Triad & Stress Fracture Prevention
- Demonstration Event
- Theory, Evidence and Innovation: Interdisciplinary Care for Parkinson's Disease
- Rehabilitation Nursing Practice: Review of Principles, Concepts, and Interventions

2014

- Therapeutic Interventions in Neurorehabilitation
- Vestibular Rehabilitation: Theory, Evidence and Practical Application

- Task Specific Training for the Neurologic Upper Extremity: A Comprehensive Approach to Evaluation and Treatment
- Prognosis, Progress, and Practice in Stroke Rehabilitation: Adapting to Changes in Healthcare
- Pediatric Gait Analysis: A Segmental Kinematic Approach to Orthotic Management
- 37th Annual Interdisciplinary Spinal Cord Injury Course
- Assessment and Treatment of Low Level Brain Injury Patients
- The Leadership and Operational Tool Box for Managing in Rehabilitation
- Brain Injury Rehabilitation: Management and Outcomes in Different Models of Care
- Walk the Walk: Locomotor Training for Patients with Stroke or Incomplete Spinal Cord Injury
- Management of the Neurologic UE, with Focus on the Hand: An Evidence Based Approach with Practical Solutions
- The Active Female Throughout the Lifespan: Clinical Updates in Sports Medicine & Women's Health
- Aphasia Therapy: What Works, the Evidence, and the History
- Update on Neuroscience Applications to Treatment of Memory Disorders
- The Active Female Throughout the Lifespan: Clinical Updates in Sports Medicine & Women's Health
- Management of Cognitive-Communication Disorders Associated with Right Hemisphere Brain Damage
- Upper Limb Prosthetics: Body Powered Components and Controls
- Update on Neuroscience Applications to Treatment of Executive Function Disorders
- From Mild Cognitive Impairment to Severe Dementia
- Medical Management of Patients with Traumatic Brain Injury and Its Impact on Rehabilitation
- The Active Female Throughout the Lifespan
- Advanced Pediatric Gait Analysis
- Rehabilitation Nursing Practice: Review of Principles, Concepts, and Interventions
- Update on Neuroscience Applications to Treatment of Memory Disorders

2015

- Vestibular Rehabilitation: Theory, Evidence and Practical Application
- 38th Annual Interdisciplinary Spinal Cord Injury Course
- Keep the Cutting Edge Sharp: An Update on Stroke Rehabilitation Care
- Update on Neuroscience: How Therapy Changes the Brain
- Update on Neuroscience: Disorders of Perception
- Neuroplasticity and Implications for Stroke Recovery
- Performance Improvement: The Power of Lean

- Non-Invasive Brain Stimulation: What We've Learned, What We're Learning, and What We Need to Know
- Ethical Implications of Social Media Engagement for Patients with Cognitive Impairments
- The Elephant in the Room: Discussion of Cancer Prognosis with Your Patient
- Transforming Leadership in a Healthcare Environment
- Development of Neural Interfaces for Robotic Prosthetic Limbs

Appendix F

Research Awards

From 2013 to July 1 2016, RIC was awarded \$74.2 million dollars in multi-year research funding, to conduct research in rehabilitation and other areas of research that are specialties of RIC researchers. RIC's new research projects from 2013 to July 1, 2016 are listed below, along with the RIC researcher who serves as the Principal Investigator of the research.

2013

- The Outcomes and Costs of Day Rehab in Malignant Brain Tumor (Stacy McCarty, MD)
- Nurse Staffing and Patient Outcomes in the Rehabilitation Setting (Kathleen Stevens)
- Comparison of Medicare Patients with TBI in the TBI Models Systems Database and the Medicare Databases (Anne Deutsch)
- PsychoMotor and Error Enabled Simulations: Modeling Vulnerable Skills in the Pre-Mastery Phase (Ferdinando Mussa-Ivaldi, PhD)
- Changes in Cerebral Palsy Using a Portable Device (Li-Qun Zhang, PhD)
- Pilot Multi-Center Evaluations of Reflex and Nonreflex (Li-Qun Zhang, PhD)
- Computational and Translational Motor Control (Konrad Kording, PhD)
- Evaluation of wrist/finger neuromuscular and biomechanical changes post stroke using a portable robot (Li-Qun Zhang, PhD)
- Power Reduction of an Embedded Pattern Recognition Myoelectric Control System (Levi Hargrove, PhD)
- The Development of an Internationally Valid ICF based Mobility Outcome Measure (Arun Jayaraman, PhD)
- Preparation of a Monograph on Targeted Reinnervation (Todd Kuiken, MD, PhD)
- SBIR Phase II "Monitoring Metabolic Energy Expenditure Via the Prosthetics of Lower Extremity Amputees" (Arun Jayaraman, PhD)
- Treatment of Post-Stroke Dysphagia with Lingual-Strengthening Therapy and Noninvasive Brain Stimulation (Laura Pitts)
- Error-enhanced Learning & Recovery in 2 & 3 Dimensions (James Patton, PhD)
- FAI Squat Study (Monica Rho, MD)
- Multi-Scale Modeling Construct of Knee Mechanic following ACL (Yasin Dhaher, PhD)
- Mechanisms underlying impaired postural corrections following stroke (Claire Honeycutt)

- Intensive Rehabilitation Research Grant Writing Workshops in the United States (William Rymer)
- (Sympathetic-Somatomotor Coupling In Human SCI) (George Hornby, PhD)
- Sympathetic-Somatomotor Coupling In Human SCI (George Hornby, PhD)
- Robotic Pelvis Manipulation Improves Dynamic Balance and Walking in Children (Ming Wu)
- Developing Outcomes Data Management and Reporting Capacity for Musculoskeletal Rehabilitation Programs (Allen Heinemann, PhD)
- Developing Quality Metrics from Patient-Reported Outcomes for Medical Rehabilitation (Allen Heinemann, PhD)
- NRI: Small: Modeling, Quantification, and Optimization of Prosthesis-User Interface (Levi Hargrove, PhD)
- Fall risk and prosthetic influence on gait biomechanics in upper limb amputees (Allen Heinemann, PhD)
- Recording neural activities onto DNA (Konrad Kording, PhD)
- Effects of Traumatic Brain Injury and Post-Traumatic Stress Disorder on Alzheimer's Disease (AD) in Veterans with Mild Cognitive Impairment (MC) (Jordan Grafman, PhD)
- Targeted Reinnervation as a means to treat neuromas associated with major limb amputation (Todd Kuiken, MD, PhD)
- Effects of (SMA) vs. (ROPPS) (Arun Jayaraman, PhD)
- TIMING INVESTIGATION DOSAGE IMPLEMENTATION (William Rymer, MD, PhD)
- Technologies to Evaluate and Advance Mobility and Manipulation (TEAMM) RERC (Todd Kuiken, MD, PhD)
- Northwestern University Advanced Rehabilitation Research Training Application (Allen Heinemann, PhD)
- Micro-processor controlled Knee-Ankle-Foot Orthosis (C-Brace) vs. Stance-control Knee-Ankle-Foot Orthosis (SCO) and conventional Knee-Ankle-Foot Orthosis (KAFO): Functional Outcomes in Individuals with Lower Extremity Impairments due to Neurologic or Neuromuscular Disease, Orthopedic Disease or Trauma (Arun Jayaraman, PhD)

2014

- Environmental Determinants of Social Participation after Spinal Cord Injury (Wing Wong)
- The Role of the Built Environment in Quality of Life for Adults with SCI (Allen Heinemann, PhD)

- Planning Activity and Nutrition Trial in Lupus to Energize and Renew (Linda Ehrlich-Jones, PhD, RN)
- In Vitro Studies on Human Cadaver (Li-Qun Zhang, PhD)
- Computer Simulations of Populations of Mammalian Motor Units (Matthew Holmes, PhD)
- Improving Psychosocial Outcomes following SCI/D with measurement Resources (Linda Ehrlich-Jones, PhD, RN)
- Using surface electromyography to assess motor unit structural change in paretic muscle post stroke (Xiaogang Hu, PhD)
- Can active elbow extension reduce shoulder loading in C5/C6 quadriplegia? (Carrie Peterson)
- Myoelectric Computer Interface to Reduce Muscle Co-Activation after Stroke (Kimberly Kopka, OT)
- Immediate and long-term outcomes of brain stimulation on inhibitory control (Katherina Hauner, PhD)
- Northwestern University Patient-centered Intervention and Engagement Training (Allen Heineman, PhD)
- High Density Surface EMG Assessment of Motor Unit Alterations After Stroke (William Rymer, MD, PhD)
- Limb Lengthening Device (Todd Kuiken, MD, PhD)
- Configuration and Adaptive Recalibration of Lower Extremity Neural Control Systems (Levi Hargrove, PhD)
- Development of a Lightweight, Rugged Prosthesis (Todd Kuiken, MD, PhD)
- Understanding Real-Life Falls in Amputees using Mobile Phone Technology (Arun Jayaraman, PhD)
- Freehand Ultrasound to Evaluate Scapular Kinematics in Paraplegic Persons (Yen-Sheng Lin)
- Altering Activation Patterns in the Distal Upper Extremity After Stroke (Derek Kamper, Elliot Roth)
- The Neural Control of Internal Joint State (Yasin Dhaher)
- NIAMS Multidisciplinary Clinical Research Center in Rheumatology (Linda Ehrlich-Jones)
- Adaptive Recalibration of a Prosthetic Leg Neural Control System (Levi Hargrove)
- TR TMR (Todd Kuiken)
- Development and Maintenance of System Management Measures (Linda Ehrlich-Jones)
- The Process of Adjustment among Caregivers of Individuals with Spinal Cord Injury: A qualitative Study (David Chen)

- Prevention of Bone Loss after Acute SCI by Zoledronic Acid: Durability, Effect on Bone Strength and the Use of Biomarkers to Guide Therapy (David Chen)
- Precursors and Prognosis of Traumatic Brain Injury in Young to Middle Aged Adults (Jordan Grafman)
- rTMS: A Treatment to Restore function after Severe TBI (Elyse Mrokwa)
- Robot-Aided Diagnosis, Passive-Active Arm Motor and Sensory Rehabilitation Post Stroke (Li-Qun Zhang)
- Developing Optimal Strategies in Exercise and Survival Skills to Increase Health & Function (DOSESS) (Elliot Roth)
- Improving Patient Outcomes through Engagement in Inpatient Spinal Cord Injury: Rehabilitation Perspectives of Patients, Clinicians, and Administrators (Allen Heinemann)
- Interpreting COPD Dyspnea change: Sensitivity, Responsiveness and Predictive Validity of the DMQ-CAT (Anna Norweg)
- Sensing and Control of Stand to Sit Motion of Wearable Bionics Suits (Arun Jayaraman)
- Embedded system (Levi Hargrove)
- Development of an Extended Measure of Global Function to Support Clinical Trials Originating in Acute Care Module (Allen Heinemann)

2015

- Airline Travel: Assistant Technology for Non-ambulatory Passengers (Jessica Pederson)
- Metaknowledge Network: Knowledge about knowledge to Answer the Big Questions (Konrad Kording)
- A Pilot Study of PROMIS Measures in People with COPD Participating in Pulmonary Rehabilitation (Susan Yount)
- Motivational Interviewing (Linda Ehrlich-Jones)
- Functional Needs Assessment in Persons with Spinal Cord Injuries and Disorders (Allen Heinemann)
- Transforming Healthcare for Women with Disabilities (Deborah Gaebler-Spira)
- Environmental Determinants of Social Participation After Spinal Cord Injury (Allen Heinemann)
- Intergovernment Personnel Assignment Agreement: Heinemann, A. (Allen Heinemann)
- MRI-navigated 3-channel TMS with 64-channel EEG instrument (Jordan Grafman)
- The Role of Uncertainty for Motor Learning and Adaption (Konrad Kording)

- 2015 International Workshop on Robotics and Interactive Technologies For Neuroscience and Rehabilitation (Ferdinando Mussa-Ivaldi)
- Motor impairment related changes in muscles properties in chronic stroke (Wendy Murray)
- Quantification of Spastic Response to the Modified Ashworth Test in Acute Stroke Subjects (Jourdan Ewoldt)
- A Formalism for Customizing and Training Intelligent Assistive Devices (Brenna Argall)
- Constraint induced movement therapy for walking in individuals post stroke (Ming Wu)
- Impact of Powered Knee-Ankle Prosthesis on Everyday Community Mobility and Social Interaction in Individuals with Transfemoral Amputations (Arun Jayaraman)
- Development of an Engaging Training Tool to Provide Superior Muscle Computer Interfaces for Rehabilitation of Neuromusculoskeletal Injuries (Levi Hargrove)
- NRI: Collaborative Research: Unified Feedback Control and Mechanical (Levi Hargrove)
- Design for Robotic, Prosthetic, and Exoskeleton Locomotion (Levi Hargrove)
- Noninvasive Manipulation of Hippocampal-cortical Brain Networks and Memory (Tommi Raij)
- Sub-Micrometer X-ray Tomography for Neuroanatomy (Konrad Kording)
- Muscle metabolism and mechanical efficiency in cerebral palsy (Richard Lieber)
- Functional Comparison Between Nerve and Tendon Transfer after SCI (Richard Lieber)
- Massive scale electrical neural recordings in vivo using commercial ROIC chips (Konrad Kording)
- Field Initiated Projects Program Motivational Interviewing and Physical Activity Change in Parkinson's Disease (Linda Ehrlich-Jones)
- Designing brain machine interfaces to drive plasticity and enhance after brain injury (David Ripley)
- CPS: Synergy: Collaborative Research: Learning control sharing strategies for assistive cyber-physical systems (Brenna Argall)
- Hand Rehabilitation using Variable Assistance through Force and EMG Feedback (Derek Kamper)
- A Novel Approach to Stem Cell Therapy for Peripheral Neuropathies (Mitra Lavasani)
- Biochronicity Grant Challenge: Human Time Stamp Development, Validation and Prediction (Jordan Grafman)

- Rehabilitation Institute of Chicago-Craig Neilsen Foundation Spinal Cord Injury Infrastructure Center (Richard Lieber)

2016

- Semi-autonomous Robotic Powered Wheelchair Functionality (Brenna Argall)
- Dynamic Allocation of Autonomy for Limited-Bandwidth Human-Robot Teams Based on Measures of Trust in the Human (Brenna Argall)
- CAREER: Robot Learning from Motor-Impaired Instructors and Task Partners (Brenna Argall)
- Intergovernmental Personnel Act Agreement (Richard Lieber)
- Maneuverability Enhancement Following Spinal Cord Injury (Keith Gordan)
- Implementing SCI-QOL into Clinical Practice to Enhance Patient Engagement (Allen Heinemann)
- A Pilot Trial to Assess Implantable Myoelectric Sensors (IMES) to Improve Prosthetic Function for Trans-humeral Amputees with Targeted Muscle Reinne (Todd Kuiken)
- Innovations in Amputation Surgery and Protheses (Todd Kuiken)
- Optical Frequency Comb NeuroController (Richard Lieber)
- Origins of Increased Motoneuron Excitability in Hemispheric Stroke (William Rymer)
- Improve dynamic lateral balance of humans with SCI (Ming Wu)
- Tracking the evolution of spasticity in acute stroke (Nina Suresh)

Appendix G

Publications

The following list of publications lists the names of articles where at least one RIC researcher was named as an author, along with the journal in which the article was published.

2013

MV Albert, C McCarthy, J Valentin, M Herrmann, K Kording, A Jayaraman. Monitoring Functional Capability of Individuals with Lower Limb Amputations Using Mobile Phones, *PLoS one* 8 (6), e65340.

Buffi JH, Crisco JJ, Murray WM. A method for defining carpometacarpal joint kinematics from three-dimensional rotations of the metacarpal bones captured in vivo using computed tomography. *J Biomech.* 2013 Jun 25.

Chang SH, Francisco GE, Zhou P, Rymer WZ, Li S. Spasticity, weakness, force variability, and sustained spontaneous motor unit discharges of resting spastic-paretic biceps brachii muscles in chronic stroke. *Muscle Nerve.* 2013 Jul;48(1):85-92.

Cherian A, Fernandes HL, Miller LE. Primary motor cortical discharge during force field adaptation reflects muscle-like dynamics. *J Neurophysiol.* 2013 May 8.

EA Corbett, R Oby. ADVANCED USER INTERFACES FOR UPPER LIMB FUNCTIONAL ELECTRICAL STIMULATION, *Intro to Neural Eng for Motor Rehab* 40, 377.

Dvorkin AY, Pacini S, Hsu N, Larson EB. Treatment challenges with profound behaviour disturbance after traumatic brain injury: A case report. *Brain Inj.* 2013;27(7-8):957-61.

BA Francis, JD Weiland, NA Sachs, EL Chang. Benzalkonium Chloride–Induced Denervation of Orbicularis Oculi Muscle in Rabbits, *Investigative ophthalmology & visual science* 54 (3), 1868-1872.

KE Gordon, CR Kinnaird, DP Ferris. Locomotor adaptation to a soleus EMG-controlled antagonistic exoskeleton, *J of Neurophysiol*, 109 (7), 1804-1814.

Heinemann AW, Hammel J, Piatt J. Promoting adoption of outcomes monitoring. Symposium presented at the annual meeting of the National Association of Rehabilitation Research and Training Centers, Alexandria, VA, April 18, 2013.

Heinemann AW, Lai J-S, Carlozzi N, Hammel J, Garcia S, Gray D, Hahn E, Magasi S, Tulskey D, Kozlowski A, Jerousek S. Development and Evaluation of Environmental Factor Items for Persons with SCI, paper presented at the annual meeting of the American Spinal Injury Association, Chicago, IL, May 6, 2013.

Heinemann AW, Williams R, Bombardier C, Forchheimer M, Fan J, Neumann H. Improving the Measurement Properties of Depressive Symptom Instruments for Use after Spinal Cord Injury, paper presented at the annual meeting of the American Spinal Injury Association, Chicago, IL, May 7, 2013.

Heinemann AW. [Patient-Reported Outcome Instrument Advances for Spinal Cord Injury Applications](#). Invited presentation at the ASIA State of Science Conference, Chicago, IL May 5, 2013.

B He, R Baird, RJ Butera, A Datta, S George, B Hecht, A O Hero, G Lazzi, R C Lee, J Liang, M R Neuman, G CY Peng, EJ Perreault, M Ramasubramanian, MD Wang, J Wikswa, G Z Yang, Y T Zhang. Grand Challenges in Interfacing Engineering With Life Sciences and Medicine. *IEEE Trans. Biomed. Engineering* 60 (3), 589-598.

Hajela N, Mummidisetty CK, Smith AC, Knikou M. Corticospinal reorganization after locomotor training in a person with motor incomplete paraplegia. *Biomed Res Int.* 2013;2013:516427.

Jayaraman A, Thompson CK, Rymer WZ, Hornby TG. Short-term Maximal-Intensity Resistance Training Increases Volitional Function and Strength in Chronic Incomplete Spinal Cord Injury: A Pilot Study. [J Neurol Phys Ther.](#) 2013 May 13.

Knikou M, Hajela N, Mummidisetty CK. Corticospinal excitability during walking in humans with absent and partial body weight support. *Clin Neurophysiol.* 2013 Jun 28.

Knikou M. Functional reorganization of soleus H-reflex modulation during stepping after robotic-assisted step training in people with complete and incomplete spinal cord injury. *Exp Brain Res.* 2013 Jul;228(3):279-96.

Knikou M. Neurophysiological characteristics of human leg muscle action potentials evoked by transcutaneous magnetic stimulation of the spine. *Bioelectromagnetics.* 2013 Apr;34(3):200-10.

Lin WP, Chen XW, Zhang LQ, Wu CY, Huang ZD, Lin JH. Effect of neuroglobin genetically modified bone marrow mesenchymal stem cells transplantation on spinal cord injury in rabbits. *PLoS One.* 2013 May 2;8(5):e63444.

DB Lipps, EM Wojtys, JA Ashton-Miller Anterior Cruciate Ligament Fatigue Failures in Knees Subjected to Repeated Simulated Pivot Landings, *The Am J of Sports Med* 41 (5), 1058-1066.

DB Lipps, JT Eckner, JK Richardson, JA Ashton-Miller How gender and task difficulty affect a sport-protective response in young adults, *J of Sports Sciences* 31 (7), 723-730.

Mummidisetty CK, Smith AC, Knikou M. Modulation of reciprocal and presynaptic inhibition during robotic-assisted stepping in humans. *Clin Neurophysiol.* 2013 Mar;124(3):557-64.

FA Mussa-Ivaldi, M Casadio, R Ranganathan The body-machine interface: a pathway for rehabilitation and assistance in people with movement disorders, *Expert review of medical devices* 10 (2), 145-147.

DB Reuben, S Magasi, HE McCreath, RW Bohannon, Y-C Wang, DJ Bubela, WZ Rymer, J Beaumont, RM Rine, J-S Lai, RC Gershon Motor assessment using the NIH Toolbox, *Neurology* 80 (11 Supplement 3), S65-S75.

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P Zhou, X Li, WZ Rymer (2013) EMG-Force Relations During Isometric Contractions of the First Dorsal Interosseous Muscle After Stroke, *Topics in Stroke Rehabilitation* 20 (6), 537-544.

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X Li, H Shin, P Zhou, X Niu, J Liu, WZ Rymer (2013) Power spectral analysis of surface electromyography (EMG) at matched contraction levels of the first dorsal interosseous muscle in stroke survivors, *Clinical Neurophysiology*.

AL Pais, BD Argall, AG Billard (2013) Assessing Interaction Dynamics in the Context of Robot Programming by Demonstration, *International Journal of Social Robotics* 5 (4), 477-490.

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