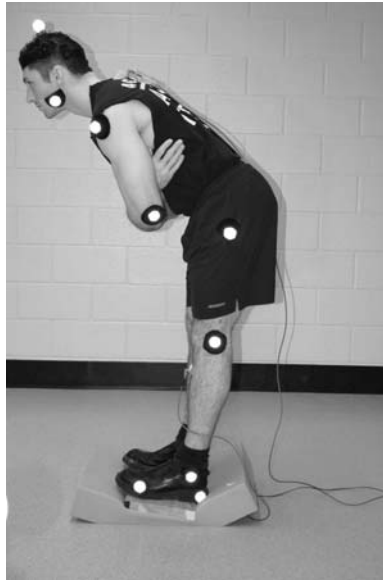


## History

The School of Medical Rehabilitation was established within the Faculty of Medicine in 1960 to meet the need for education of occupational therapy and physical therapy professionals in the Province of Manitoba. In 2002 the School expanded to include a respiratory therapy education program. Graduate training in rehabilitation research first began in 1989 with a Master of Physical Therapy degree. The program expanded in 1993 and was renamed the Master of Science in Rehabilitation. An interdisciplinary doctoral program, PhD in Applied Health Sciences, was established in 2007. This degree is offered through collaboration between faculty members within the School and the Faculties of Kinesiology and Recreation Management, Nursing and Human Ecology. Further research capacity was gained in 2008 when funding was received from the Canadian Chiropractic Research Foundation to support a five year Professorship in Spine Biomechanics and Human Neurophysiology.

## Research Activities

Theory and practice in the rehabilitation disciplines concerns human functioning including prevention of loss, remediation following illness or injury and adaptation of abilities and environments to meet client needs and support health promotion. The research activities within the School's programs is centered around the conceptual model of the



*Vicon Motion Analysis reflective markers are placed on a participant, performing balance activities on a sponge.*

International Classification of Functioning, Disability and Health (ICF) developed by the World Health Organization (2001). The ICF model provides a descriptive framework and a prescriptive focus for a diverse but complementary range of research program activities. The ICF model identifies that the constructs of body functions and structures, activities and participation interact with environmental and personal factors to influence human functioning, disability and health. Researchers in the School of Medical Rehabilitation use a variety of research approaches, including quantitative, qualitative, participator action and mixed methods to increase knowledge, and examine evidence for practice and the translation of evidence to practice.

Researchers within the School who study Body Functions and Structures are interested in understanding the physiological and anatomical components of the body as they relate to functioning, disability and health.

Examples of research activities within this ICF construct include: the role of the nervous system in regulating inflammation, biomechanical factors regarding trunk stabilization, and pain physiology research using human models of acute pain.

Researchers who study Activity (the execution of a task by an individual) and Participation (individuals involvement in life situations) are interested in understanding disability and the relationship between abilities and functioning. Examples of research activities within this construct include: cognitive and musculoskeletal factors that determine driving performance among older adults, factors that determine physical activity levels in various client populations, and evaluation of various rehabilitation strategies to optimize balance and locomotion.

Researchers who study Environmental Factors and Personal Factors that impact functioning, health and disability are interested in understanding ways in which the environment serves to facilitate or impede activities and participation, especially for those with compromised abilities. Environmental innovations to address client needs are also developed and studied. Some examples of research activities within this construct include: computer-related ergonomic factors that impact on individuals with carpal tunnel syndrome, integration of occupational therapy and physical therapy

services in primary health care in Winnipeg and assessment of organizational supports for user participation in mental health service planning and evaluation.

In addition to defining research areas under the framework of ICF, defined areas of research expertise have been developed within the School in the following areas:

#### **Dynamic Balance Assessment**

Poor balance, reduced mobility, fear of falling and fall injuries are serious problems facing many older adults and people who have suffered acquired or traumatic brain injury. With the objective of maximizing mobility maintenance or restoration of mobility and fall prevention, an integrative program of research is ongoing.

#### **Interactive Exercise Using Video Gaming**

Interactive exercise using video gaming is a novel method of approaching rehabilitation of finger and hand function. A portable and configurable interface device (ID) with core technology and miniature motion sensors that can transform virtually any object into a "universal" video game controller has been developed providing patients undergoing rehabilitation with a fun way to practice specific finger-hand-arm movements and exercises. The interactive exercise gaming approach has also been applied to balance and stepping exercises. A separate system was developed which uses a flexible pressure mapping system to obtain centre of foot pressure (COP) trajectories.

Software was developed to use the coordinate COP position signals to control video game play in the same way as the computer uses mouse coordinates.

#### **Pain Research**

Pain impacts human function at many levels. Pain research is conducted to study kinematic and kinetic parameters associated with pain and the impact of treatment interventions on these parameters. In addition, researchers use quantitative sensory testing to provide objective evaluation of sensory and pain thresholds in normal, anesthetic and hyperalgesic states. Further, measurement of autonomic nervous system activity such as cutaneous peripheral blood flow, skin conductance and heart rate variability provides objective data which can be perturbed and modulated systematically. A variety of pain models are used, ranging from mechanical and chemical cutaneous nociception to muscle pain in human subjects in order to better understand the body structures and functions associated with pain.

#### **Dynamics of Human Movement and Musculoskeletal Function**

The study of neuromechanics of human movement in normal and patient populations includes the assessment of dynamics and forces involved in human movement during various functional tasks that the musculoskeletal system is required to undertake, the basic physiological mechanisms that underlie the control and production of human movement and how abnormal physiological processes manifest in patient populations. Investigations also compare patients with control populations to identify differences in neuromuscular performance and examine the efficacy of remedial interventions.

#### **Assistive Technologies**

Research in this area involves the development, evaluation and application of assistive technologies to support client functions. Assistive technology provides an interface between a person with a disability and the environment in which the individual lives, works and plays. Research in assistive technology is team focused and requires the contribution and expertise of various disciplines such as occupational therapists, engineers and psychologists. Specific areas of current and ongoing research in the School include: the effectiveness of ergonomic keyboards for people who experience repetitive strain injuries; the satisfaction, functional performance and experiences of people who use various types of manual and power wheelchairs; the development of a tool to measure the accessibility of public information and communication technologies; and the study of the ergonomics and equipment design associated with musculoskeletal injuries.

#### **Client-centred Practice**

Research in this area focuses on the ways that people who use occupational therapy and health services participate in decisions about a) their own care, b) program planning and evaluation, and c) health and social policy development. Research initiatives include investigation into how occupational therapists implement client-centred processes, how people who use mental health services would like to be involved in program

development and evaluation, the development of a theoretical framework for the implementation of client-centred approaches and the development of a model citizen-user participation in mental health policy.

### **Professional Education and Knowledge Translation**

Several researchers in the School are interested in research related to professional education and knowledge translation. Research in these areas includes evaluation of teaching and learning, development of professional reasoning and student quality of life. As well, researchers in the School collaborate with researchers in other disciplines to develop and evaluate interprofessional education initiatives.

### **Research Facilities**

Specialized research facilities, equipped to meet the needs of the various programs, are conveniently housed in two locations: the Bannatyne Campus and the Rehabilitation Hospital of the Health Sciences Centre. The Aging, Social Cognition and Rehabilitation Research Laboratory, the Applied Exercise Physiology Laboratory, the Human Clinical Pain Research Laboratory, the Human Performance Laboratory, the Occupational Performance Research Laboratory and the Posture and Gait Laboratory are the hubs for the various research activities that are an integral part of the research programs at the School.

### **Research Collaborations**

The School of Medical Rehabilitation is located at the Bannatyne Campus in downtown Winnipeg. This Campus is adjacent to the Health Sciences Centre, a major teaching hospital, with acute and rehabilitation-related facilities available for people across the lifespan. Faculty in the School participate in research collaborations with colleagues from various departments and sections within the Faculty of Medicine including Community Health Sciences, Family Medicine, Pharmacology and Therapeutics, Physiology, Surgery and Rehabilitation Medicine. Collaborations also exist with the Faculties of Education, Engineering, Human Ecology, Nursing, and Kinesiology and Recreation Management, as well as with the Centre for Disability Studies, the Health, Leisure & Human Performance Research Institute, the Spinal Cord Research Centre, the Centre on Aging, and Cancer Care Manitoba. Research collaborations are routinely forged with clinicians, clients, government and recipients of rehabilitation services. Public and private industry collaborations have resulted in the development and evaluation of new technologies and environments to support the activities of people with disabilities and for the prevention of disease and promotion of healthy living.

### **Graduate Training Opportunities**

Aside from the entry-to-practice professional training programs, the Master of Science (Rehabilitation) graduate program is designed to provide research training to individuals in the field of rehabilitation. The program requires the completion of course work and a research-based thesis, which entails the completion of an original

study related to rehabilitation. A four year Baccalaureate degree or equivalent in Physical Therapy, Occupational Therapy, Respiratory Therapy or a related discipline (e.g. kinesiology, biomedical engineering, exercise science) is required for admission to this program. The PhD in Applied Health Sciences is designed to provide advanced research education in health sciences. The program combines the strength of in-depth discipline-specific learning with the benefits of collaborative learning with students and faculty from other disciplines.

### **For further information:**

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