

Seminar

Biomechanical Study of Upper Limb Pain in Manual Wheelchair Users with Paraplegia

Dr. Sue Ann Sisto

Thursday, January 22, 2004

United Technologies Building, Room 150

2:00-3:00 pm

Abstract:

Due to lower limb paralysis, individuals with spinal cord injury (SCI) rely extensively on their upper limbs for mobility and activities of daily living. Unfortunately, activities like wheelchair propulsion and transfers place great demands on the bones, joints, and soft tissues of the upper limbs. These essential activities can hasten the aging process leading to injury and pain. Thus, any loss of upper limb function will significantly affect mobility and independence. Upper limb pain in individuals with SCI has profound implications at individual and the societal levels by decreasing independence and community integration, and increasing the risk of other secondary conditions.

The study to be discussed involves 200 participants is at three sites: University of Pittsburgh, the Kessler Medical Rehabilitation Research and Education Corporation (KMRREC), and the University of Washington. The goal of this study is to determine modifiable biomechanical factors present during wheelchair propulsion and transfers that predict the degree of pathology, clinical findings, and subjective pain in the upper limbs of individuals with paraplegia. The specific aims of this study are to determine the presence of shoulder pathology with MRI; determine wrist pathology with nerve conduction studies; determine the presence of significant clinical findings of injury through a physical examination of the shoulder and wrist to determine the presence of self-reported upper limb symptoms via the use of questionnaires. The following measurements will also be taken: upper limb kinematics and kinetics during wheelchair propulsion, upper limb kinematics and kinetics during transfers, subject characteristics (anthropometrics, weight, years with SCI) and wheelchair set up (axle position relative to the shoulder, width of the chair, wheelchair weight).

Completing these aims with over 200 individuals with paraplegia will result in the largest biomechanics study to date, and the largest MRI and NCS series in individuals with SCI. This database will make it possible to provide other critical information on other factors, such as the effect of weight, duration of paralysis, and age on upper limb pain, as well as the effect of wheelchair set up on propulsion biomechanics.

While much has been published identifying the prevalence of upper limb pain in individuals with SCI, very little has been published on its treatment and even less on its prevention. There is little literature indicating how an individual should propel or transfer from a wheelchair in such a way as to reduce the risk of injury. Indeed, more research is needed to determine the specific factors related to wheelchair propulsion and transfers that lead to upper limb injury. This model systems collaborative study presents a unique opportunity to overcome this limitation and carry out this vital work.

Dr. Sue Ann Sisto, P.T., MA, Ph.D. is the Director of Human Performance and Movement Analysis Laboratory (HPMAL) at Kessler Medical Rehabilitation Research and Education Corporation (KMRREC) and has been a Physical Therapist for 25 years.