**Title and Focus of Activity:** Exercise considerations for persons living with a spinal cord injury (SCI): Lecture and experiential learning activities *Prevention, Health Promotion, Fitness and Wellness*

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**Course Information:** Therapeutic Exercise II (Therapeutic Exercise for Patients with Neurological Disorders); 1.5 credits; Summer of Year 2; concurrent with Neurological Patient Management course

**Learning Experience Description**: Context/Purpose: Each weekly topic of the Ther Ex course follows previous or concurrent Neurological Patient Management course content. The purpose of this week’s activity is to provide a foundation for prescribing exercise to persons living with a SCI. Additionally, experiential learning activities provide insight to the challenges to exercise faced by those living with a SCI.

Class is held for 2-hours on Tuesday and Thursday. The Tuesday session is purely lecture-based while the Thursday session involves 3 experiential learning activities.

Lecture: The Tuesday lecture session provides specific instruction on an evidence-based approach to exercise prescription for individuals with SCI. A general overview provided in this lecture includes:

* health consequences of inactivity and benefits of physical activity in the SCI population,
* personal and environmental factors that contribute to barriers to exercise in persons with SCI,
* methods to promote physical activity in persons with SCI,
* screening for exercise readiness,
* incidence and prevalence on adverse events resulting from exercise,
* development of a specific exercise program for persons with SCI,
  + the relationship between residual lower extremity muscle strength and function in persons with incomplete SCI
  + exercise considerations for persons with complete motor SCI (AIS-A or B)

For exercise considerations, research literature outlines the relative muscle demands of specific functional tasks commonly performed following SCI (e.g. pressure-relief maneuvers, transfers, wheelchair propulsion, overhead reach). Emphasis is placed on the specific role of individual muscle function (i.e. strength, power, or endurance) for each activity in order to better understand the basis for exercise prescription. Consideration is given to the level of SCI and specific recommendations are detailed for both resistance training as well as aerobic activity. Additional lecture information covers the role of exercise in persons with SCI who are experiencing shoulder pain. Specific research programs investigating the effect of exercise on preventing and ameliorating shoulder pain in this population are described and contrasted. Finally, the role of exercise in the chronic SCI population is presented with an emphasis on health promotion, combined resistance and aerobic training, as well as community-based resources and technology.

Experiential Learning Activities: Three distinct experiential learning activities are provided during the 2-hour Thursday session. The first 2 activities have students working in pairs with 1 student participating in the activity from a wheelchair and their partner being responsible for documenting their experience (students switch roles during each activity). The first activity involves students accessing the campus fitness center to perform a comprehensive resistance exercise routine from a wheelchair (designed for a person with SCI). The fitness center has weight machines, free weights including kettle bells, as well as resistance bands, and students are encouraged to attempt exercises using all available equipment. Both students document the experience of this first activity with a focus on accessibility of the facility and equipment, need for and ease of transfer to weight machines, and ability to perform exercises using free weights and resistance bands from a wheelchair.

The second activity consists of participation in 2 wheelchair sports: basketball and tennis. Students are initially provided with information on classification of wheelchair athletes and the basic rules of each sport. Students then play an abbreviated 3-on-3 wheelchair basketball game and doubles wheelchair tennis match. The student responsible for documenting this second activity is focused on the difficulty performing sports that are commonly played by students, energy requirements of participating in wheelchair sports, as well as the level of joy, frustration, and competitiveness of their partner.

This third activity is a 20-minute, instructor-led group exercise class with an emphasis on cardiovascular fitness. All students perform this activity either from a wheelchair or seated on a therapy ball. This activity emphasizes the ease/difficulty of performing exclusively upper extremity exercises to reach a targeted training heart rate.

Time for student to complete the activity: 1. preparation for activity outside of/before class: 1 – 2 hours for assigned readings 2. class time completion of the activity: 4 hours

Readings/other preparatory materials: 1. Nash MS, van de Ven I, van Elk N, Johnson BM. Effects of circuit resistance training on fitness attributes and upper-extremity pain in middle-aged men with paraplegia. *Arch Phys Med Rehabil* 2007; 88(1): 70-75 2. Mulroy SJ, Thompson L, Kemp B, et al. Strengthening and optimal movements for painful shoulders (STOMPS) in chronic spinal cord injury: a randomized controlled trial. *Phys Ther* 2011; 91(3): 305-324 3. Martin KA, Jorgensen S, Stapleton J. Exercise and sport for persons with spinal cord injury. *Phys Med Rehabil* 2012; 4:894-900.

Previously assigned readings

1. American College of Sports Medicine. Position Stand: Progression models in resistance training for healthy adults. *Med Sci Sports Exerc* 2009; 41(3): 687-708

2. US Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans. 2008; <http://www.health.gov/paguidelines/pdf/paguide.pdf>

3. O’Sullivan SB, Schmitz TJ. Physical Rehabilitation: Assessment and Treatment. 6th ed. Ch. 20, Philadelphia, PA. F.A. Davis. 2013.

Learning Objectives 1. Explain the relationship between muscle strength and function in persons living with a SCI. 2. Discuss the direct and indirect changes that occur within the muscular, nervous, and cardiovascular system as a result of a SCI. 3. Explain the secondary health effects of living with a SCI. 4. Discuss the critical elements of resistive training programs designed to enhance muscle strength, power, and local muscle endurance including the influence of: type of muscle action, velocity of muscle action, loading, exercise volume, exercise selection, exercise order, training frequency, and rest periods 5. Describe the role of resistance training in the context of a comprehensive treatment plan for individuals with a SCI. 6. Identify barriers to exercise and physical activity in persons living with a SCI. 7. Explain the benefits of specific exercise training programs on function, health, and fitness for persons living with a SCI. 8. Design a comprehensive exercise program for persons living with a SCI who are currently participating in a physical therapy program including identification of exercises to be performed during physical therapy treatment sessions as well as those to be performed as part of a home exercise program. 9. Design a community-based exercise program for persons living with a SCI for the purpose of improving function, health, and fitness.

Methods of evaluation of student learning: 1. A weekly quiz tests student learning of basic principles of exercise related to individuals with SCI 2. The final written exam further tests student learning related to exercise program design for individuals with SCI 3. The final competency exam has 1 of 4 case studies related to design of an exercise program for an individual with SCI 4. Students are required to write a “Reflections on Disability” paper for the concurrent Neuromuscular Patient Management course.