PTAT-2302: NEUROMUSCULAR REHABILITATION IN PHYSICAL THERAPY

Cuyahoga Community College

Viewing: PTAT-2302 : Neuromuscular Rehabilitation in Physical Therapy

Board of Trustees:
November 2024

Academic Term:
Fall 2025

Subject Code
PTAT - Physical Therapist Assist

Course Number:
2302

Title:
Neuromuscular Rehabilitation in Physical Therapy

Catalog Description:
Physical therapy techniques and procedures required for the rehabilitation of adult patients with selected neurological diagnoses and impairments.

Credit Hour(s):
4

Lecture Hour(s):
3

Lab Hour(s):
3

Requisites

Prerequisite and Corequisite
BIO-2341 Anatomy and Physiology II, and PTAT-1402 Clinical Pathophysiology and Pharmacology, PTAT-1420 Therapeutic Exercise, and departmental approval.

Outcomes

Course Outcome(s):
A. Utilize effective communication skills to establish patient rapport and maintain patient confidentiality.

Essential Learning Outcome Mapping:
Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):
1. Performance of patient care skills using effective and professional communication with patient/client and health care team.
2. Demonstrate professional communication for a diverse population that is sensitive to race, culture, gender and age.
3. Describe how cultural diversity can impact the patient therapist relationship and effect outcomes of patient/client interventions.
4. Recognize and appropriately decipher both verbal and nonverbal communication with patient/client and healthcare team.
5. Demonstrate a proper introduction to patient that includes identification as a student and obtaining informed consent.
6. Apply HIPAA guidelines, keeping all preventative care center (PCC) participant information confidential.
7. Explain the roles of the various disciplines that comprise the rehabilitation team, including the goals of the rehabilitation process.
8. Exhibit conduct that reflects a commitment to members of society receiving healthcare, the profession of physical therapy, and standards that are legal, ethical and safe.

Course Outcome(s):

B. Discuss and demonstrate proper treatment approach for the patient diagnosed with Parkinson's Disease.

Objective(s):

1. Discuss etiology, symptoms, signs, and physical therapy management of the patient with Parkinson's Disease.
2. Discuss the pyramidal system.
3. Discuss the Unified Parkinson Disease Rating Stages and demonstration of application of this knowledge when treating a patient with this pathology.
4. Discuss neurological or muscular involvement in posture and gait deviations and perform appropriate interventions.
5. Teach functional activities to the patient including discussion of functional training of mobility, self-care, feeding and adaptive devices.
6. Describe appropriate elements of the exercise program for the patient with Parkinson's Disease.
7. Discuss the action, indications, side effects and physical therapy implications and common names of dopamine replacement agents.

Course Outcome(s):

C. Discuss and demonstrate proper treatment approach for the traumatic brain injury (TBI) patient.

Objective(s):

1. Discuss training of the TBI patient based on level of involvement as indicated in the Rancho Los Amigos and Cognitive Functional Scale.
2. Differentiate between decerebrate and decorticate posturing.
3. Teach functional activities to the patient with TBI.
4. Discuss and perform exercise, functional activities, gait training and precautions for patients with TBI.
5. Discuss patient's response after head injury and documentation of response via the Glascow Coma Scale.
6. Explain the impact of cognitive and neurobehavioral impairments on physical therapy treatment.
7. Demonstrate the appropriate manner to respond to each level of consciousness.
8. List characteristics of upper motor neuron and lower motor neuron lesions.
9. Discuss etiology, symptoms, signs, and physical therapy management of the patient with TBI.
10. List the levels of consciousness and stages of recovery for the head trauma patient.
11. Discuss the action, indications, side effects and physical therapy implications and common names of antiepileptic agents

---

Course Outcome(s):

D. Discuss and demonstrate proper treatment approach for the spinal cord injury (SCI) patient.

Objective(s):

1. Define autonomic hyperreflexia and identify the symptoms and signs and respond appropriately.
2. Teach functional activities to the patient including discussion of functional training of wheelchair skills, mobility, self-care, adaptive devices and pressure reduction.
3. Discuss discharge planning that allow patient reentry into home, community, school and work.
4. Discuss etiology, symptoms, signs, and physical therapy management of the patient with SCI.
5. Differentiate between quadriplegia and paraplegia and distinguish what motor and sensory function is associated with each level of injury.
6. Discuss the expected level of functioning for the various levels of SCI and demonstrate the protocols for achieving expected levels of functioning.
7. Discuss the pyramidal system in terms of corticospinal tract and its function and common pathologies seen with damage to this area.
8. Discuss differentiation of dermatomes and myotomes and their functional effects on the patient/client.
9. Distinguish the difference between complete and incomplete injury of the spinal cord. Describe the following: Brown-Sequard syndrome; central cord syndrome; sacral sparring.
10. Explain tenodesis and demonstrate how this is used in the quadriplegic.
11. Describe the autonomic nervous system and discuss its role in homeostasis.
12. Discuss the action, indications, side effects and physical therapy implications and common names of antispasticity agents.

Course Outcome(s):

E. Determine the wheelchair and assistive device requirements for home and community safety.

Objective(s):

1. Discuss ideal postural alignment in sitting.
2. Discuss and demonstrate ability to determine source of problem for postural deviations.
3. Demonstrate ability to obtain measurements of patient/client in sitting for wheelchair adaption.
4. Recognize safety issues and potential barriers in home, community, and work environments.
5. Determine the most appropriate wheelchair or assistive device for the neurological patient.
6. Determine clearance of wheelchair or appropriate assistive device around furniture, flooring and doorway clearance.
7. Design a progression of wheelchair management in home or other environment.
8. Demonstrate competence in teaching family and caregivers how to transfer a patient using the Hoyer lift, including when it is appropriate to use.
9. Demonstrate the effective use of the tilt table for physical therapy intervention in patients with neurological disorders, including when it is appropriate to use.

.

Course Outcome(s):

F. Demonstrate ability to accurately record patient treatment based on the plan of care of the supervising physical therapist.

Objective(s):

1. Demonstrate competence in implementing, recognizing and monitoring response to positional changes and activities.
2. Discuss the utilization of the International Classification of Functioning Disability and Health (ICF) when describing patient/client's impairments, activity and participation limits.
3. Collect and provide information on community resources for patient receiving rehabilitation and discuss the need for community outreach and advocacy for these patient populations.
4. Explain the roles and responsibilities and the supervisory relations between physical therapist (PT) and physical therapist assistant (PTA) as described in the Guide to Physical Therapist Practice.
5. Demonstrate competence in implementing selected components of interventions identified in the plan of care as established by the physical therapist.
6. Demonstrate ability to monitor and adjust interventions in the plan care in response to patient status and clinical indications.
7. Demonstrate ability to report any changes in patient status or progress via documentation and communication with the supervising physical therapist.
8. Discuss and demonstrate ability to appropriately document patient level of assistance in correlation to the Functional Independence Measure (FIM) scale.
9. Explain the roles of the various disciplines that comprise the rehabilitation team including the goals and discharge planning in the rehabilitation process.
10. Collect information on community resources for patients receiving rehabilitation and the need for community outreach and advocacy for these patient populations in anticipation of discharge.
11. Apply the subjective, objective, assessment, plan (SOAP) note format to patient/participant care documentation in a clear, concise and accurate manner.
12. Maintain patient/participant confidentiality with all documentation.
13. Identify and demonstrate proper billing minutes and how they apply to a rehabilitation skilled care setting.
14. Demonstrate proper handling and care of patient/client and provide accurate documentation of encounter in a timely manner.
15. Apply knowledge of impairment and disability terminology to patient/client care interactions with respect and compassion.
16. Obtain and record measurements, such as range of motion (ROM) and vital signs and accurately document in SOAP note.

Course Outcome(s):

G. Demonstrate application of knowledge of psychosocial factors and their effect on patient care.

Objective(s):

1. Recognize the psychological and social impact of disability on the patient and their family.
2. Integrate skills previously mastered and apply to all patient populations.
3. Discuss and demonstrate awareness of the need for professional and ethical conduct in all health care activities.
4. Discuss the health care team approach to assisting patient with finding counsel with quality of life issues, and healthy coping strategies.

5. Recognize and discuss knowledge of stages of adjustment in regard to diagnosis of a chronic condition and how it can impact treatment interventions.
6. Discuss the various coping mechanisms.
7. Discuss how the patient's environment can enhance or inhibit their rehabilitation and interventions to address this.

Course Outcome(s):

H. Differentiate motor control, motor learning and implement strategies to improve motor function.

Objective(s):

1. Differentiate between motor learning and motor control.
2. Distinguish convergence of sensory information within the multimodal areas of the cerebrum.
3. Discuss the effect of neurotransmitters on the nervous system.
4. Discuss and implement use of motor loops and their effect on initiation of voluntary, planned, coordinated, multi-joint movements.
5. Distinguish between learning and performance.
6. Provide feedback to healthcare team and patients that is clear, concise and sensitive.
7. Recognize the importance of intrinsic and extrinsic feedback in a closed loop system for learning and acquiring new motor skills.
8. Recognize persistent reflexes beyond the age of development that are indicative of neurological involvement.
9. Discuss the action, indications, side effects and physical therapy implications and common names of muscle relaxant agents.

Course Outcome(s):

I. Discuss and demonstrate proper treatment approach for the cerebrovascular accident (CVA) patient.

Objective(s):

1. Identify the anatomical regions of the brain and explain the functions of each region.
2. Differentiate between spasticity, rigidity and muscle spasm.
3. Discuss etiology, symptoms, signs, and physical therapy management of CVA.
4. Distinguish various diseases and injuries that might result in hemianopsia and adapt treatment plan to accommodate for it.
5. Differentiate between ischemic and hemorrhagic strokes.
6. Describe apraxia and identify various diseases and injuries that might result in apraxia.
7. Modify treatment techniques for the patient with apraxia.
8. Demonstrate competence in performing passive range of motion with patients with abnormal tone and/or abnormal joint movement,
9. Discuss various diseases and injuries that might result in aphasia and differentiate between the various types of aphasia.
10. Discuss various diseases and injuries that might result in agnosia.
11. Discuss various diseases and injuries that might result in dysarthria and differentiate between aphasia and dysarthria.
12. Recognize various diseases and injuries that might result in hemiplegia or hemiparesis.
13. Discuss various diseases and injuries that might result in dysphagia.
14. Teach functional activities to the patient with CVA.
15. Discuss neurological and muscular involvement in posture and gait deviations and perform appropriate interventions.
16. Determine appropriate assistive device, if indicated.
17. Discuss and perform exercise, functional activities, gait training and precautions for patients with CVA.
18. Select appropriate interventions to progress the CVA patient based on abnormal tone and stage of recovery.
19. Discuss the action, indications, side effects and physical therapy implications and common names of drugs prescribed for CVA patients.

Course Outcome(s):

J. Discuss and demonstrate proper treatment approach for the patient with cerebellar dysfunction.

Objective(s):

1. Identify and demonstrate compensation strategies for balance loss.
2. Progress patient treatment based on patient ability to learn and perform compensatory techniques.
3. Recognize and monitor patient response to positional changes.
4. Differentiate the terms lightheadedness, orthostatic hypotension, benign paroxysmal positional vertigo (BPPV), vertigo, oscillopsia and disequilibrium.

5. Describe the parts of the cerebellum and functions associated with each part.
6. Describe and perform various tests and measures of balance and vestibular disorders and recognize various compensatory strategies utilized.
7. Discuss the extra-pyramidal system and the effects on the cerebellum and vestibular nuclei.
8. Discuss and perform exercise, functional activities, gait training and precautions for patients with cerebellar dysfunction.

Course Outcome(s):

K. Discuss and demonstrate proper treatment approach for the amputee patient.

Objective(s):

1. Identify major etiological and other risk factors involved in lower extremity amputations.
2. Identify levels of lower extremity amputations.
3. Identify the types of lower extremity prosthetics and orthotics and their major components.
4. Describe the lower extremity prosthetic training program and identify when the patient needs to return to the prosthetist for checks or re-fitting.
5. Analyze various amputee gait deviations and their possible causes and instruct in correction of gait deviations.
6. Perform prosthetic gait training on level surface and stairs and progress patient appropriately.
7. Instruct patient in proper pre-prosthetic care of the residual limb, including hygiene, skin inspections, exercise and positioning to prevent contracture.

Course Outcome(s):

L. Discuss and demonstrate proper treatment approach for the patient/client with multiple sclerosis (MS).

Objective(s):

1. Discuss and perform exercise and functional activities, being mindful of the precautions for intervention with the MS patient.
2. Describe ataxia and how to modify treatment for the MS patient with ataxia.
3. Teach functional activities to the patient with neurological or neuromuscular involvement.
4. Discuss the impact of multi-system involvement in the patient with MS.
5. Discuss possible cognitive and behavioral changes due to MS pathology.
6. Perform appropriate interventions for neuromuscular involvement and progress as indicated in the plan of care.
7. Discuss etiology, symptoms, signs, and physical therapy management of the patient with MS.
8. Discuss the action, indications, side effects and physical therapy implications and common names of antispacticity agents prescribed for the patient with MS.

Course Outcome(s):

M. Discuss and demonstrate proper treatment approach for the patient diagnosed with amyotrophic lateral sclerosis (ALS).

Objective(s):

1. Discuss the functional staging for the patient with ALS.
2. Differentiate between impairments related to lower motor neuron, upper motor neuron and bulbar impairments.
3. Describe considerations that must be taken into account when designing an exercise program and functional activities for the patient with ALS.
4. Discuss implication of dysarthria and dysphagia when treating the patient/client with ALS.
5. Discuss etiology, symptoms, signs, and prognosis of the patient with ALS.

Methods of Evaluation:

1. Written examinations
2. Practical laboratory examinations
3. Laboratory skill checks
4. Presentations
5. Homework assignments
6. Discussion boards

7. Professional behavior and participation
8. Participation in PCC

Course Content Outline:

A. Documentation
1. FIM levels
2. Functional assessment and impairment terminology
3. Disablement terminology
4. Interpretation of terminology
5. Documentation of neurological treatment

B. Verbal and nonverbal communication
1. Establishing professional rapport with the patient
2. Methods of alleviating patient's fears
3. Differentiating between verbal/nonverbal communication
4. Maintaining patient privacy and confidentiality
5. Beginning/ending procedural steps, clinical decision making
6. Communication techniques for diverse populations
7. Acceptance and appreciation of cultural diversity

C. Psychosocial adjustment to disability
1. Emotional reactions to chronic conditions
2. Coping strategies
3. Factors that influence adjustment
4. Stages of adjustment
5. Quality of life issues
6. Stress and relaxation response

D. Motor learning
1. Nervous system gross anatomy
2. Motor loops
3. Learning vs performance
4. Intrinsic vs extrinsic feedback
5. Classification of movements
6. Stages of motor learning
7. Developmental skills
8. Types of memory and neuroplasticity
9. Role of neurotransmitters

E. Treatment approach for CVA
1. Stroke statistics and risk factors
2. CVA vs transient ischemic attack (TIA)
3. Ischemic vs hemorrhagic stroke
4. Blood supply to the brain
5. Stroke signs and symptoms
6. Abnormal tone and influencing factors
7. Synergy patterns
8. Stages of recovery
9. Definition and history of neurodevelopmental training (NDT)
10. Treatment of left vs right hemisphere
11. Perceptual disabilities
12. Visual field defects associated with lesions of visual system
13. Left hemisphere lesion and effects on communication
14. Pusher’s syndrome
15. Pharmacological management

F. Treatment approach for cerebellar dysfunction
1. Gross anatomy of cerebellum
2. Sensory mechanisms of postural control
3. Motor strategies for balance control
4. Functional balance grades for documentation

5. Role of reticular and vestibular nuclei
6. Maintenance of equilibrium
7. BPPV
8. Nystagmus

G. Treatment approach for amputee

1. Factors that influence vascular disease
2. Risk factors for amputation
3. Potential complications of amputation
4. Levels of amputation
5. Post-operative care of the residual limb
6. Types of post-operative dressings
7. Prosthetic intervention
8. Components of a prosthesis
9. Prosthetic socks, sheaths, liners and volume change
10. Prosthesis and gait deviation
11. Orthotics

H. Treatment approach for MS

1. Epidemiology
2. Scientific theories of causes
3. Symptoms and diagnosis
4. Courses of disease
5. Common areas of demyelination
6. Cognitive and behavioral disturbances
7. Exacerbating factors
8. Pharmacological management

I. Treatment approach for amyotrophic lateral sclerosis (ALS)

1. Etiology
2. Symptoms and terms associated with ALS
3. Classifications of ALS
4. Treatment phases

J. Treatment approach for Parkinson’s disease

1. Epidemiology
2. Symptoms and impairments
3. Therapy considerations
4. Stages of disease
5. Deep brain stimulation
6. Music therapy and dual task treatment for Parkinson’s disease
7. Pharmacological management

K. Treatment approach for traumatic brain injury (TBI)

1. Epidemiology
2. Causes and types of injury
3. Secondary brain damage
4. Effects from TBI
5. Abnormal posturing
6. Glascow coma scale
7. Rancho Los Amigos scale levels of cognitive function
8. Symptoms of post-concussion syndrome
9. Pharmacological management

L. Treatment approach for SCI

1. Epidemiology
2. Non-traumatic and traumatic causes
3. Mechanism of injury
4. Dermatomes and myotomes
5. Incomplete injuries

6. Hyperreflexia/ autonomic dysreflexia
7. Functional skills for complete lesions

M. Wheelchair assessment

1. Ideal postural alignment in sitting
2. Postural deviations
3. Wheelchair measurements
4. Wheelchair safety and maneuvering

N. Environmental assessment

1. Home assessment
2. Adaptive equipment and assistive devices
3. Hoyer lift and tilt table
4. Homecare checklist
5. Environmental barriers and safety
6. Universal design
7. Discharge planning

Resources

O'Sullivan, Susan, et al. *Physical Rehabilitation*. 8th ed. F.A. Davis, 2024.

Ciccone, Charles D. *Pharmacology in Rehabilitation*. 5th ed. F.A. Davis, 2022.

Best, Janie T., et al. *Pathophysiology, Physical Assessment, and Pharmacology: Advanced Integrative Clinical Concepts* . F.A. Davis, 2021.

Giles, Scott M. "Neuromuscular and Nervous System" *PTA Exam: The Complete Study Guide*. Scorebuilders, 2024.

Bezkor, Edward, et al. *Improving Functional Outcomes in Physical Rehabilitation*. 3rd ed. F.A. Davis, 2021.

Gutman, Sharon A. *Quick Reference Neuroscience for Rehabilitation Professionals:The Essential Neurologic Principles Underlying Rehabilitation Practice*. 4th ed. Slack, 2024.

Shumway-Cook, Anne, et al. *Motor Control: Translating Research Into Clinical Practice*. 6th ed. Wolters Kluwer, 2022.

Lazaro, Rolando T., et al., editors. Umphred's. *Neurological Rehabilitation*. 7th ed. Elsevier, 2019.

Top of page
Key: 5276