



Connecting Upper Extremity Biomechanics to Functional Activities

This lesson plan is designed to apply a biomechanical approach to analysis of upper extremity movement, development of interventions in therapeutic exercise and functional activities, and clinical reasoning of client change over time.

Learning Objectives

By the end of this activity, the successful student will:

1. Apply appropriate frames of reference that underlie practice to inform and support therapeutic exercise interventions.
2. Demonstrate movement and activity analysis of performance skills to develop therapeutic exercise interventions following a musculoskeletal injury (rotator cuff repair).
3. Utilize clinical reasoning to develop appropriate occupation-based interventions to promote increased occupational engagement following a musculoskeletal condition (rotator cuff repair).
4. Monitor and reassess the effect of occupational therapy interventions following a musculoskeletal injury (rotator cuff repair).

This activity supports the requirements for:

- *The Accreditation Council for Occupational Therapy (ACOTE) standards (2018):*
 - *OT: B.2.1, B.3.6, B.4.3, B.4.22*
 - *OTA: B.2.1, B.3.6, B.4.3, B.4.22*
- *The Commission on Education for Physical Therapy Education (CAPTE) standards:*
 - *PT: 7A, 7D19k, 7D20*
 - *PTA: 7D19, 7D23h*

Connecting UE Biomechanics to Functional Activities

Watch

Assign the following videos of Alice (018) that show her status at 2 weeks post-op:

- Rotator Cuff Repair, 2 weeks post: Patient Interview, Part 1
- Rotator Cuff Repair, 2 weeks post: Patient Interview, Part 2
- Rotator Cuff Repair, 2 weeks post: Patient Interview, Part 3
- Rotator Cuff Repair, 2 weeks post: Home Exercise Program, Seated and Supine
- Rotator Cuff Repair, 2 weeks post: Home Exercise Program, Standing

Discuss

1. What four muscles make up the rotator cuff? What is the primary action of each muscle?
2. Which muscle(s) of the rotator cuff do you anticipate were injured and subsequently repaired, based on Alice's reports?
3. There are some mild lingering problems from the left shoulder surgery a few years ago. How might this influence your intervention planning for the right shoulder?
4. Alice's early progress will depend, in part, on her engagement in the therapeutic exercise program.
 - a. What are the advantages of passive range of motion (PROM) for Alice?
 - b. What are the advantages of active assisted range of motion (AAROM) for Alice?
 - c. What are the advantages of active range of motion (AROM) for Alice?
5. How was her therapeutic exercise program affected by her decision to have carpal tunnel repair surgery at the same time as the shoulder surgery?
6. Which functional activities are affected by the shoulder surgery? Which functional activities are affected by carpal tunnel surgery?
7. Alice is able to perform standing exercises safely in her home.
 - a. How would you adapt the post-op therapeutic exercises for a person with decreased balance?
 - b. How would you adapt the post-op therapeutic exercises for a person with decreased cognition?

Movement Analysis

Complete a movement analysis

- Estimate ROM of the joints during the exercises. Students can watch on their laptops, pause the videos, and use a goniometer (when possible) to measure the joint angles. Ensure correct goniometer placement since there are adaptations from the typical testing procedure in the stretches.
- Students can share how close their estimated measures are to the actual joint angles, and what influenced their accuracy.
- At each joint (shoulder, elbow, forearm, and wrist), have the students identify the movement, prime movers, and approximate range during each exercise.

Intervention Plan 1: 2 Weeks Post-Op

Ask students to develop an **intervention plan to address occupation-based performance**, such as ADLs and/or IADLs. Assume Alice will be treated in her home.

Watch

Assign these videos of Alice (018) that show her progress at 6 weeks post-op:

- Rotator Cuff Repair, Part 1: Initial Assessment
- Rotator Cuff Repair, Part 2: Measuring Range of Motion
- Rotator Cuff Repair, Part 3: Increasing ROM in shoulder flexion
- Rotator Cuff Repair, Part 4: Increasing ROM in shoulder abduction

Discuss

1. How would you describe Alice's progress from the initial videos at 2 weeks post rotator cuff repair, if you were reporting to the medical team?
2. What impairments remain that you need to address, related to her musculoskeletal function (ie type of ROM, soft tissue tightening or shortening, strength?)
3. Alice describes significant pain without the support of the sling. How will this influence your intervention planning and instructions related to functional activities?
4. Will you take a remediation or compensatory approach to intervention? Justify your answer.

Intervention Plan 2: 6 Weeks Post-Op

Ask students to write an **intervention plan focused on therapeutic exercise** for the next 6 weeks. Assume that Alice will be coming to outpatient therapy twice a week for the next 6 weeks.

Intervention Plan 3: 6 Weeks Post-Op

Ask students to develop an **intervention plan to address occupation-based performance**, such as ADLs and/or IADLs. Create this plan for Alice's out-patient therapy visits.