

Exercise Therapy

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Define muscle re-education. Write in detail about re-education of quadriceps from grade 0-5.

Definition

Muscle re-education is the therapeutic process of restoring voluntary control, coordination, and strength of muscles that have become weak or inactive due to injury, surgery, or neurological impairment. It involves facilitation, activation, strengthening, and functional retraining of muscles

Grade-wise Protocol

Grade 0 (No contraction)

Goal: Initiate muscle activity

Treatment: Electrical stimulation (NMES) to quadriceps

Facilitation: tapping, quick stretch, Mental imagery

Protocol: NMES: 10–15 min, 3–5 times/week

Example: Patient supine, attempt quadriceps contraction (quad setting)

Clinical Note: Used in post-surgery (ACL, knee replacement) or nerve injury

Grade 1 (Trace contraction)

Goal: Achieve visible/palpable contraction

Treatment: NMES + voluntary contraction, Active-assisted exercises

Protocol: 10–15 repetitions × 2–3 sets

Example: Assisted knee extension in supine

Grade 2 (Full ROM without gravity)

Goal: Full movement in gravity-eliminated plane

Treatment: Active exercises in supported position, Begin isometric strengthening

Protocol: 10–15 reps × 2–3 sets

Isometric hold: 5–10 sec

Example: Side-lying knee extension, Straight leg raise (assisted)

Grade 3 (Against gravity)

Goal: Functional movement

Treatment: Active ROM against gravity, Begin light resistance

Protocol: 8–12 reps × 2–3 sets

Intensity: ~40–50%

Example: Knee extension in sitting, Straight leg raise

Clinical Note: Essential for walking and standing

Grade 4 (Moderate resistance)

Goal: Improve strength and control

Treatment: Progressive resisted exercises, Add eccentric training

Protocol: 10–12 reps × 3 sets

Intensity: 50–70%

Example: Theraband knee extension, Partial squats,
Step-ups

Grade 5 (Normal strength)

Goal: Full strength and functional recovery

Treatment: Advanced strengthening, Functional and high-level exercises

Protocol: 8–12 reps × 3–4 sets

Intensity: 70–85%

Example: Full squats, Lunges, Sit-to-stand without support.

Reference: Kisner, Carolyn Therapeutic exercise: foundations and techniques / Carolyn Kisner,
Lynn Allen Colby. — 5th ed.

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