

Strength Lab

Objective: The student will become familiar with the procedures used to assess the strength of the lower extremities.

Materials: 1. Gloves
2. Muscle Strength Assessment Form

Procedure:

1. **ROM Exam:** Done with gloves and the patient supine, shoes and socks off.

The strength of each muscle group should be recorded in a systematic fashion. It is wise to pair the testing of each muscle group immediately with testing of its contralateral counterpart to enhance detection of any asymmetries.

Muscle strength is often rated on a scale of 0/5 to 5/5 as follows:

- 0/5: no contraction
- 1/5: muscle flicker, but no movement
- 2/5: movement possible, but not against gravity (test the joint in its horizontal plane)
- 3/5: movement possible against gravity, but not against resistance by the examiner
- 4/5: movement possible against some resistance by the examiner
- 5/5: normal strength

Hip Flexion

This test assesses muscle strength of the iliopsoas, and innervation via the femoral nerve, and L1-L3 nerve roots at L1 through L4.

- The patient is instructed to raise their leg about 1 foot off of the table while keeping it straight.
- The clinician places both their hands on the lower anterior portion of the raised leg.
- The clinician instructs the patient not to let them push it down.
- The clinician applies reasonable force to the leg in a downward direction while encouraging the patient to resist.
- The patient is instructed to put their leg down.
- The procedure is repeated for the opposite leg.

Knee Extension

This test assesses muscle strength of the quadriceps, and innervation via the femoral nerve at L2 through L4.

- The patient is instructed to bend both knees slightly.
- The clinician places one hand at the posterior bend of the knee while the other hand is on the lower anterior portion of the raised leg.
- The clinician raises the foot about 1 foot off of the table.
- The clinician instructs the patient not to let them push their lower leg down.
- The clinician applies reasonable force to the lower leg in a downward direction while encouraging the patient to resist.

- The patient is instructed to put their leg down.
- The procedure is repeated for the opposite leg.

Knee Flexion

This test assesses muscle strength of the Hamstrings or semitendinosus, semimembranosus, and biceps femoris, and innervation via the sciatic nerve at L5, S1 & S2.

- The patient is instructed to bend both knees slightly.
- The clinician places one hand at the anterior bend of the knee while the other hand is on the lower posterior portion of the raised leg.
- The clinician instructs the patient not to let them straighten out their leg.
- The clinician applies reasonable force to the lower leg in an upward direction while encouraging the patient to resist.
- The patient is instructed to put their leg down.
- The procedure is repeated for the opposite leg.

Leg Abduction

This test assesses muscle strength of the Gluteus medius, Gluteus minimus and Tensor fasciae latae, and innervation via the Superior gluteal nerve at L4, L5 & S1.

- The patient is instructed to bend both knees slightly.
- The clinician places one hand at the lateral aspect of the bend of the knee on each leg.
- The clinician instructs the patient to push their knees apart.
- The clinician applies reasonable force to knees to keep them together while encouraging the patient to resist.
- The patient is instructed to put their legs down.

Leg Adduction

This test assesses muscle strength of the Obturator externus, Adductor longus, magnus, and brevis, as well as the Gracilis, and innervation via the Obturator nerve at L2 through L4.

- The patient is instructed to bend both knees slightly.
- The clinician places one hand at the medial aspect of the bend of the knee on each leg.
- The clinician instructs the patient push their knees together.
- The clinician applies reasonable force to knees to push them apart while encouraging the patient to resist.
- The patient is instructed to put their legs down.

Foot Dorsiflexion

This test assesses muscle strength of the Tibialis anterior, and innervation via the Deep peroneal nerve at L4 and L5.

- The patient is instructed to keep both legs straight.
- The clinician places one hand at the dorsum of the foot.
- The clinician instructs the patient push their foot up towards their face or dorsiflex the foot.
- The clinician applies reasonable force to the dorsum of the foot while encouraging the patient to resist.
- The procedure is repeated for the opposite foot.

Toe Dorsiflexion

This test assesses muscle strength of the Extensor hallucis longus and Extensor digitorum longus, and innervation via the Deep peroneal nerve at L5 and S1.

- The patient is instructed to keep both legs straight.
- The clinician places one hand at the dorsum of the foot directly over the toes.
- The clinician instructs the patient push their toes upwards.
- The clinician applies reasonable force to the dorsum of the foot at the toes while encouraging the patient to resist.
- The procedure is repeated for the opposite foot.

Foot Plantarflexion

This test assesses muscle strength of the Triceps surae including the gastrocnemius and soleus, and innervation via the Tibial nerve at S1 and S2.

- The patient is instructed to keep both legs straight.
- The clinician places one hand at the plantar surface of the foot.
- The clinician instructs the patient push their foot downwards, or plantarflex the foot
- The clinician applies reasonable force to the plantar surface of the foot while encouraging the patient to resist.
- The procedure is repeated for the opposite foot.

Foot Eversion

This test assesses muscle strength of the Peroneus longus and Peroneus brevis, and innervation via the Superficial peroneal nerve at L5 and S1.

- The patient is instructed to keep both legs straight.
- The clinician places one hand at the plantar aspect of the lateral side of the foot and one hand on the ankle to lock it.
- The clinician instructs the patient push their foot out against the clinicians hand.
- The clinician applies reasonable force to the plantar aspect of the lateral side of the foot while encouraging the patient to resist.
- The procedure is repeated for the opposite foot.

Foot Inversion

This test assesses muscle strength of the Tibialis posterior, and innervation via the Tibial nerve at L4 and L5.

- The patient is instructed to keep both legs straight.
- The clinician places one hand at the plantar aspect of the medial side of the foot and one hand on the ankle to lock it.
- The clinician instructs the patient push their foot in against the clinicians hand.
- The clinician applies reasonable force to the plantar aspect of the medial side of the foot while encouraging the patient to resist.
- The procedure is repeated for the opposite foot.

2. Record your findings on the Basic Functional Foot Assessment Form provided.