How to Use this Manual

Use one new manual for each new patient you treat; it will become their personal exercise manual that they can even use as part of a home exercise program. When the patient discharges from your care, be sure to educate them on the importance of continuing this exercise program.

This guide is meant as a starting point for new amputees. While the exercises contained in this manual are a comprehensive guide to treating a patient with the loss of a limb, they are not meant as a guide to treating the patient as a whole. These exercises concentrate only on building the core muscles required to ambulate with a prosthesis. A skilled therapist will supplement these limb loss exercises with other case appropriate exercises/treatment to provide each patient with the individualized care they require. This means the therapist should identify any other co morbidities that could hinder rehabilitation progress. Examples include identifying and treating any back pain, sound limb deficits such as hip, knee or ankle pain, sound limb contractures, and more.

Contracture Management
Make sure your treatment includes oversight and management of any joint contractures; both the prevention and correction. Be sure you distinguish the difference between muscle tightness and muscle shortness. Muscles that are ‘tight’ will show improved flexibility on the first therapy session and will only require a small amount of time before they exhibit normal range of motion (ROM). On the other hand, muscles that are ‘shortened’ will require a minimum of 4 weeks of stretching before there is a noticeable improvement in ROM; if any improvement in muscle length occurs at all.

Please Note: Prosthetists should not accommodate for a contracture within a prosthesis unless ample therapy time has been given to remedy a tight or shortened muscle.
Treatment Overview

1. Functional Mobility
   - Transfers
   - Bed Mobility
   - Positioning/Stretching

2. Strengthening/Conditioning
   - Prepares the patient for prosthetic ambulation

3. Residual Limb Management
   - Reduce Limb Swelling using a Shrinker
   - Desensitization (See Below)
   - Scar Mobilization (See Below)

Within 1-2 Weeks of Post-Op
Conduct Desensitization Exercises Using:
   - Ice Cubes
   - Pin
   - Towel
   - Deep Pressure
   - Heat
   - Brush

When Incision is Healed and “With Only Very Small Scabs”
Begin to mobilize tissue around incision using:
   - Cocoa Butter (or Similar)

This will also supplement a stump shrinker by bolstering venous return. Plus it will loosen subcutaneous tissues so tissues move more freely. Pay particular attention to any tissue adherence to the distal tibia or distal femur. Pressures inside of a prosthesis will displace tissues on the limb and any tissue that is “hypo-mobile” can be symptomatic and can prevent the patient from making progress in their rehabilitation.
Goals of the Pre-Prosthetic Program

1. Trans-Femoral patients should work towards achieving 0-10 degrees of hip extension.

2. Patient should complete a minimum of 6 weeks of strength/ROM training on the primary prosthetic gait muscles outlined in this manual.

   The patient should be independent with the exercise program and also understand the importance of being diligent with the program. Educate your patient so that they understand these exercises will require a lifestyle change.

3. The patient should be able to tolerate a minimum of 30 minutes of physical activity.

4. Following sufficient soft tissue mobilization, the patient should be able to tolerate pressure and tissue displacement on the distal end and incision without pain.

5. The incision should be fully healed and good soft tissue mobility should be established.

6. It is imperative that patients continue an independent exercise program even after prosthetic gait training has been initiated. Preferably, the patient will continue their exercises on their own, outside of therapy, so that therapy appointments can focus on gait training. This will encourage further muscle development that will supplement any gait training conducted during regular therapy appointments.

7. They should be independent with transfers and bed mobility; this includes the independent ability to roll prone.

What is Possible?

Trans-femoral (above the knee) patients on the other hand are more challenging and only small percentages ever achieve a natural and efficient gait without the use of a walker or cane. While there are significant physical limitations that affect a patient’s trans-femoral rehabilitation the psychological limitations can be far more challenging. A patient’s personality, and their ability to accept risk, oftentimes determines their ultimate outcome, regardless of how much therapy they receive. For instance, a person that has a confident risk-taker personality will tend to do better with a trans-femoral prosthesis than the person that has lower confidence and who doesn’t feel comfortable taking risks. The mechanical challenge of walking with a trans-femoral prosthesis is risky and the sense of falling is always in the forefront of a patients mind limiting their progress.
Important Pre-Prosthetic Consideration

Over the past 20-30 years, the standard of care for amputees has evolved into the philosophy that therapists should get an amputee walking (single leg hopping with a walker) as quickly as possible. Patients pre-prosthetic measure of success has been determined by how many feet they can walk with a walker, but without a prosthesis. This standard of care, compounded by the belief that there is little a therapist can do with a patient without a prosthesis, is leading to less favorable limb loss outcomes.

We support a different treatment philosophy that is promoting better limb loss outcomes. The following information will provide you with an alternative method of treatment that we have found to produce better patient outcomes. The following philosophy not only stems from the teachings of Robert Gailey, PhD, PT but also from the unique experience we have gained by treating this patient population exclusively.
Important Pre-Prosthetic Considerations

NO SINGLE LEG HOPPING WITH A WALKER!!!

1. Puts excessive stress/strain on sound limb.
2. Puts the patients Center of Balance (COB) over sound limb (see below).

**Center of Balance (COB)**

Maintaining proper COB over BOTH extremities is essential for developing proper prosthetic gait (see pictures below). By maintaining COB awareness the patient maintains their minds inherent ability to “perceive” where their amputated limb is in space or what is called proprioception. Walking (hopping) and standing with a walker automatically requires the patient to shift their COB over their sound foot. This begins to teach the patient that this is the only limb they can rely on for safe ambulation. Once the patient has received their prosthesis they will naturally continue this habit, because it’s what they’ve learned. Alternatively, if the patient never experiences repeated COB positioning over their sound limb, they retain awareness of their amputated leg. This awareness is automatically recruited when they begin to use a prosthesis.

1. The more time a patient spends standing and hopping on one leg the more difficult (if not impossible) it is for them to get their COB over both extremities when they begin to wear a prosthesis.
2. Failing to maintain a natural COB awareness will prevent the patient from achieving their full potential. Please discourage walking until your patient receives their prosthesis, no walking is better for you than single leg hopping.

Instead of single leg hopping, pre-prosthetic therapy should focus on:

- Flexibility
- Contracture management
- Both Core and lower extremity strengthening
- Bed mobility
- Health/mobility of incision
Amputee Exercises

This manual is a basic guide that will initiate pre-prosthetic training. It is important that patients develop good muscle strength and joint flexibility to promote a safe, efficient and natural prosthetic gait. The exercises contained in this section are a comprehensive guide to treating a patient’s loss of a limb, they are not meant as a guide to treating the patient’s other deficits that may hinder rehabilitation.

These exercises should be initiated during the post-op treatment of an amputee, continued as an out-patient pre-prosthetic protocol and then used as a home exercise program.

Exercise Instructions
After a thorough evaluation the therapist will need to establish an initial number of repetitions per exercise for each individual patient.

Bridging Over Bolster

Lay on your back with your legs over the roll. Contract your gluteus muscles and straighten your legs to lift your hips off the ground. Be sure to lift both hips equally using gluteus muscles – NOT your back muscles.
Single Leg Bridging

Lay on your back with one leg on the roll while extending the other leg in the air. Contract your gluteus muscles and straighten your legs to lift your hips off the ground. Be sure to lift both hips equally using gluteus muscles – NOT your back muscles.

Short Arc Quadricep

Lay on your back with both legs over the roll. Straighten your leg while keeping it on the roll. Be sure to keep your foot in a neutral alignment, with your toes pointed back throughout the exercise.
**Straight Leg Raise**

Lay on your back with your sound leg fully extended on the ground in front of you. Place your other leg on the roll. Keeping your sound leg straight, raise it up until it is the same height as your the leg over the roll. Hold this position for a count of 3 seconds before returning to the starting position. Relax the quadriceps for a count of 2 seconds and repeat. Be sure to keep your knee straight, your foot in a neutral alignment, with your toes pointed back throughout the exercise.

**Ankle Pumps**

Lie on your back with your legs extended out in front of you. Keeping your foot in neutral position, point your toes away from you, pause, and then bring your toes back towards your head as far as you can. Repeat.
Side Lying Hip Abduction - Modified

Lay on your side. Make sure your body is a straight line with your legs fully extended over the roll. Contract your gluteus muscles and lift your hips off of the bed. Hold your hips off the ground for a count of 3 seconds and return to the starting position. Be sure to stay on your side throughout the exercise without rolling forward or backward.

Side Lying Hip Abduction - Advanced

Lay on your side. Make sure your body is in a straight line. Fully extend your bottom leg over the roll, while elevating your top leg directly above it. Contract your gluteus muscles and lift your hips off the ground for a count of 3 seconds before returning to the starting position. Your top leg should remain elevated over the bottom leg for the duration of the exercise. Be sure to stay on your side throughout the exercise without rolling forward or backward.
**Prone Hip Extension**

Lay on your stomach. Lift your leg off the ground. Be sure to keep your body flat on the ground throughout the exercise and do not arch your back. Only lift your leg as high as you can without raising your hip off the ground.

**Prone Hip Extension (Sound Limb)**

Lay on your stomach with your knee bent at a 90º angle. Keeping your knee bent, lift your leg off the ground. Be sure to keep your body flat on the ground throughout the exercise and do not arch your back. Only lift your leg as high as you can without raising your hip off the ground.
**Prone Knee Flexion**

Lay on your stomach with your legs fully extended behind you. Bend your knee as far back as you can without lifting your hip or arching your back. Then lower your leg back down to starting point in a controlled motion. Be careful to keep your knee pointed straight into the mat without rotating your lower leg. Repeat on both sides.

**Prone Abductor Squeeze**

Lay on your stomach with your legs fully extended behind you. Place the roll between your legs and squeeze for a count of 5 seconds. Relax and repeat.
Push-ups

Lay on your stomach with your knees on the ground. Place your hands down in front of you (shoulder-width apart). Lower yourself to the ground and pause. Extend your arms to lift your upper body back to the starting position and repeat. Keep your hips down and stomach tight throughout the exercise. Do not arch your back.

Quadruped Leg Lift

Get on your hands and knees with your hands placed directly under your shoulders and your knees directly under your hips. Keeping your body still, pull your belly button towards your spine and hold. Keeping your back flat, raise your leg, pause, and return to the starting position. Repeat on both sides.
Abdominal Curl-up

Lay on your back with your legs fully extended in front of you. Raise your arms straight in front of your chest. In a controlled manner, roll up to sitting position until you reach the end of your physical range. Return to the starting position in a controlled manner, one vertebrae at a time. Repeat.

Bosu Head Twists

Sit on the bosu and balance in an upright position with your hands in your lap. Rotate your head from side to side in a controlled manner. Next, raise head and lower your head in a controlled manner. Repeat. Be sure to maintain an upright posture throughout the exercise. Do not use your sound side leg to balance on the ground.
Sit on the bosu and balance in an upright position. Grasp a weighted ball with hands. Be sure to maintain an upright posture throughout the exercises.

1. Starting in a downward position, raise the ball directly over your head, pause, and return to the starting position in a controlled manner. Repeat.

2. Starting with the ball at one side, raise your arms across your body and above your head, pause, and return to the starting position in a controlled manner. Repeat on both sides.

3. Starting with ball directly in front of your chest, rotate from side to side in a controlled manner while maintaining an upright position.