LIFTS WITH CARE

Liko

Therapeutic Interventions

Enhancing and Maintaining Outcomes

Purpose: The demand of facilities to protect workers by creating safety environments of care has not overlooked the concurrent efforts of therapeutic discipline's obligation to their patients. As professionals, therapists have one of the most physically demanding specialties in healthcare. This document is confirmation of Liko's efforts to assisting in patient therapeutic interventions and outcomes, as well as ideas for protecting therapists in healthcare.

Goals: As a reviewer of this document, begin to identify how the identified equipment can help maintain and enhance patient's independence, protect one-self, and enhance one's clinical skills. By enhancing a patient's independence means that a therapist can accelerate patient outcomes by applying the safety equipment in conjunction with a therapist's intervention. If a patient feels safer and is safer from the increased security of a piece of equipment or sling, their confidence increases, affecting positive outcomes.
Enhancing one's skills means that while utilizing and trusting the piece of equipment, the clinician can remove themselves more from the physical efforts and concentrate on their skills as an observer and evaluator and less on creating an environment which allows difficult observational vantage points because of the therapists efforts to help control or compensate for patient weaknesses and abilities.

Target Audience: The therapeutic disciplines refer to primarily Physical and Occupational therapy for acute, sub-acute and long term care settings. Other disciplines relevant may include any credentialed therapy assistants, aids and/or restorative personnel.

Format: The document is formatted from patient dependency to independence and from physical to occupational therapy. This format does not apply to patient progressive importance. Although some of the medical information included may be review for medical personnel, it is relevant to compliment the piece of equipment with its associated physiological significance and ability to protect the therapist/clinician.

Disclaimer: Application methods described in this document were based on patient response to therapeutic interventions. Relative and absolute contraindications to therapeutic interventions are at the discretion of the therapeutic discipline, the physician and the patient.

General equipment review: Please refer to the Liko documentation, hands-on demonstration and practice for each piece of Liko equipment mentioned in this document.

Liko Repositioning Sheet/Turning Straps/Friction Reduction Sheets: (Reference to promotion of movement in bed)

- Enhanced postural drainage
- Fluid redistribution/dependent edema reduction
- Pressure relief

Liko Sabina: (Reference in movement "to stand" and standing)

- Flexibility: The use of one Sabina sit to stand lift cycle can take a patient through many joint movements including but not limited to: ankle dorsiflexion/plantar flexion, knee flexion/extension, hip flexion/extension, anterior/posterior pelvic tilting, lumbar flexion/extension, shoulder flexion/extension, elbow flexion/extension, wrist supination and to some degree, radial and ulnar deviation.
- Muscle actions: The use of one Sabina sit to stand lift cycle can take a patient through many muscle actions (concentric, eccentric and isometric) and muscle stabilizers, including but not limited to muscles of the: trapezius, levator scapulae, rhomboids, serratus anterior, pectoral group, deltoid, biceps, triceps, biceps femoris, gluteals, quadriceps, gastrocnemius, soleus, flexor digitorum longus, and tibialias anterior, and pelvic floor musculature.
- Long bone and pelvic girdle loading.

Liko Golvo, Viking and Overhead Track Systems: (Reference to promotion of more independent weight bearing and ambulation:

- Flexibility and Muscle Actions: The use of one weight bearing event can take a patient through many joint movements and muscle actions similar to those incorporated by the Liko Sabina, but with feet aligned more vertically under the hips and knees. In addition, balancing and stabilizing forces initiated by gravity, flooring surface, footwear, and the use of assistive devices may also have significant influence on initiating weight bearing with progression to ambulation.
- Gait cycle: With an erect upper torso, ambulation actions include: pelvic rotation, hip flexion/extension and some medial and lateral rotation, various degrees of knee flexion and extension, ankle plantar and dorsiflexion, foot supination and pronation.

Patient Presentation

1. Bed Rest
2. Limited Mobility
3. Standing, Movement in standing and Ambulation
4. Additional Diagnoses

Bed Rest*:*
Many of the physiological impairments in critical care are related to oxygen transport. Many factors related to oxygen transport impairments include:

- Underlying pathophysiology of disease or condition
- Immobility-loss of physical exercise stress
- Recumbency-loss of vertical gravitational stress
- Extrinsic factors-those related to the patient's care
- Intrinsic factors-those related to the patient

The therapeutic treatment hierarchy for oxygen transport impairments may include, but are not limited to:

1. Mobilization and exercise-Elicit exercise stimulus addressing a combination of acute, long term and preventative effects.
2. Body Positioning-Hemodynamic effects related to fluid shifts and the cardiopulmonary effects on ventilation and its distribution, perfusion, ventilation, and perfusion matching and gas exchange.
3. Breathing control-to augment ventilation, to facilitate mucuciliary transport and to stimulate coughing.
    - Coordinated breathing with activity and exercise

4. Relaxation and Energy Conservation Interventions
    - Relaxation procedures at rest and during activity
    - Energy conservation
    - Pain control
5. ROM Exercises (Cardiopulmonary indications)
    - Active
    - Assisted Active
    - Passive
6. Postural Drainage (facilitate airway using gravitational effects)
7. Manual techniques (facilitate airway clearance with specific body positioning)
    - Manual percussion

The therapist chooses the activities that have the greatest effect on remediation of the oxygen transport deficits. Therapists will balance between oxygen supply and demand while coordinating therapy treatment with nursing care, certain tests and procedures. All are used to determine appropriateness of activities during the therapy process.

The following are used to optimize body positioning in bed with or without degrees of patient assistance:

- **Liko Repositioning sheet** (i.e., Movements to align patients needing positioning from side to side and/or positioning up in bed)
- **Liko Turning straps** (i.e., Using the turning straps to perform and hold a static side-lying position may allow for manual chest percussion exercise with the aim of loosening retained secretion from the airways.)
- **Liko friction reduction sheets** (Ready Sheet and Ready Slide- Preparing for a position change with friction reduction devices, placing the slide sheet underneath, moving the patient toward the head of the bed, turning the patient to the side)

The following are used to optimize physiological changes, mobilization and exercise:

- **Liko Sabina**: Used to facilitate partial to full weight bearing with feet in front on a supportive foot plate. Activities include balance, weight shifting, static weight bearing, sit to standing repetitions,
  pelvic positioning in standing, etc….
- **Liko Sabina**: Used as a protective device for raising and holding a patient in a seated position (on the side of the bed) with no intention of standing. Facilitating independent/assisted sitting, postural drainage, breathing control, some upper extremity ROM, and higher level of body positioning without the need of therapist to be placed in seated spinal rotation.

Limited mobility

Within a few days, the physiological effects of bed rest consist primarily of skeletal muscle atrophy leading to weakness, discoordination and balance difficulty. Posture imbalances may result from poor postural alignment. Skin breakdown over boney prominences such as the sacrum, trochanters, elbows, scapulae, and heels may develop. Overall, multi-system negative effects develop.

Fluid volume redistribution

- Decreased plasma and blood volume/venous stasis
- Decreased total heart and left ventricular volumes
- Diuresis and natriuresis
- Hypercalciuria

Muscular Inactivity

- Loss of muscle mass

- Loss of muscle endurance
- Loss of muscle strength

Altered distribution of weight and pressure
- Bone demineralization
- Local skin changes

Other etiology
- Decreased resting and maximum stroke volume
- Decrease orthostatic tolerance
- Cardiovascular deconditioning
- Constipation
- Increase anxiety, hostility and depression
- Increased auditory threshold
- Increase in focal point, decreased near point of visual acuity

To combat the deleterious effects of limited mobility (acute and long term) a therapist's primary concern is mobilization and exercise. Below are examples of mobilization interventions though body positioning and erect postures.

Body Positioning

Mobilizing the body through positioning is a significant therapeutic intervention. Those body positions that elicit or stimulate upright postures and increased movement are optimal and most justified physiologically.

Body Positioning can:
- Increase mucociliary transport and mucus clearance
- Facilitate diaphragmatic breathing
- Optimize chest tube drainage
- Facilitate/Promote urinary drainage
- Control pain
- Promote relaxation
- Decrease airway resistance
- Promote comfort
- Enhance venous return

The following are used to optimize body positioning in bed with or without degrees of patient assistance:
- **Liko Repositioning sheet** (i.e., Movements to align patients in bed after "out of bed" therapy, positioning from side to side, positioning up in bed)
- **Liko Turning straps** (i.e., Using the turning straps to perform and hold a static side-lying position may allow for manual chest percussion exercise with the aim of loosening retained secretion from the airways.)
- **Liko friction reduction sheets** (Ready Sheet and Ready Slide)

Erect Postures

Many interventions may depend on the patient's ability to re-develop strength and endurance through weight bearing exercises. Standing exercises independently, actively assisted, or performed using an assistive device are promoting higher demands on incontinence changes, respiratory relief, cardiopulmonary circulation, joint flexibility and musculoskeletal actions.

Liko Sabina: Used to facilitate partial to full weight bearing with feet in front on a supportive foot plate. Activities include balance, weight shifting, static weight bearing, sit to standing repetitions, etc…)

*Review the Sabina flexible options below to help facilitate optimal treatment goals.

1. Applying the **Liko seat strap** prior to or during standing or adjusting during standing, cues the patient to initiate hip extension and new posterior pelvic positioning.
2. **Liko Sabina modified**: Removing the footplate and underneath support brace allows the therapist to cue the patient to place the feet in an optimal "standing ready" position (i.e., feet staggered underneath the knees as opposed to the feet in front position), while safely raising and supporting the patient in standing. Strapping the front leg position against the knee pad, allows maximum contraction of the opposing leg. Alternate and repeat legs as applicable.
3. **Liko Sabina**: Facilitate upper extremity ROM, strength and endurance testing while patient is securely attached to the Sabina in standing.

Standing, Movement in standing and Ambulation

Evaluation of standing positions and movement to ambulation is a higher level of independence that a therapist strives. Liko safe patient equipment allows the therapist to evaluate the degree of independence patients will exhibit and allow therapist to re-assess, modify, and progress toward defining outcomes. Below is a review of the long term physiological effects of higher levels of mobility and exercise.

Cardiopulmonary
- Decrease submaximal minute ventilation
- Increase respiratory muscle strength and endurance
- Increase collateral ventilation
- Increase pulmonary vascularization

Cardiovascular
- Increase myocardial muscle mass
- Increase myocardial efficiency
- Enchanced venous return

Exercise-induced bradycardia
- Decreased orthostatic intolerance
- Decreased RHR and BP
- Decrease submaximal perceived exertion and breathlessness
- Decreased submaximal HR, BP and Rate Pressure Product
- Decreased stroke volume at rest and submaximal work rates
- Increase thermoregulatory efficiency

Hematologic
- Increase circulating blood volume/lymphatic return
- Increase optimize number of RBC
- Increase the optimization of hematocrit
- Decrease cholesterol
- Decrease blood lipids

CNS
- Increase sense of well-being
- Increase concentration

Genitourinary
- Increase glomerular filtration
- Increase urinary output

Gastrointestinal
- Increase gut motility
- Decrease constipation

Neuromuscular
- Enhanced neuromotor control
- Increase efficiency of postural reflexes associated with type of exercise
- Increase reflexive control
- Increase movement efficiency and economy
- Increase proprioceptive sensation

Musculoskeletal
- Increase muscle vascularization
- Increase myoglobin
- Increase muscle metabolic enzymes
- Increase glycogen storage capacity
- Improved biomechanical efficiency
- Increased movement economy

Muscle Hypertrophy
- Increase muscle strength and endurance
- Increase ligament tensile strength

Endocrine
- Efficiency of hormone production and degradation to support exercise

Immunological
- Increase resistance to infection

Integumentary
- Increase efficiency of skin as a heat exchanger
- Increase sweating efficiency

The following are used to optimize standing, movement in standing and ambulation.

Liko Golvo, Viking and Overhead Track Systems:
Promoting more independent standing without the need of referenced orientation. The equipment provides a system for safe training, without limiting the duration, frequency or intensity goals while enhancing patient's abilities to perform more under the safety framework of the equipment. This allows therapists to evaluate more factors that contribute to increased metabolic demand and oxygen consumption associated with higher level mobility and exercise: Below is a list of additional factors:
- Thermoregulatory changes
- Body positioning
- ROM exercises (passive, active or active assist)
- Anxiety
- Discomfort
- Pain
- Agitation
- Muscle tremors

A therapist may use the equipment to adapt and combine various body positions especially in erect position with the following maneuvers:

Using the Safety Harness:
- …in conjunction with thoracic mobility exercises, that is, extension, flexion, side flexion and rotation.
- …in conjunction with active, active assist and passive ROM of the upper and lower extremities when applicable.
- …for breathing control exercise in conjunction with body movements
- …in conjunction with Liko in-line scale for direct weight bearing and non weight bearing measurements and/or percentage of patient assistance during activity.

A therapist may also use the equipment to proceed with higher level activities such as:
Using the Safety Harness:
- … for patient use over parallel bars, treadmills, cycling machines, etc…
- … for patient use with assistive devices like walkers, canes, crutches, etc…
- … for patients using balance boards, weights, pulleys, etc…
- … for patients performing independent squats, therapeutic ball balance, etc…
- … for patients performing gait training.

Additional diagnosis
A therapist may refer to methods/options related to the movement of patients with conditions related to the lower extremity. Weight bearing status is established by the physician. Restrictions can be met therapeutically or counseled to nursing using a variety of Liko equipment and/or sling options. These options will support and protect movement for transfers, bed and gait mobility.

- Total hip replacement (hip arthroplasty). Refer to Liko options to keep the hip abducted and flexed greater than 90 degrees.
- Knee replacements. Liko Golvo and Sabina may be utilized to accommodate the patient depending upon weight bearing abilities, knee extension/flexion, edema, opposing leg condition, etc…
- Pelvic fracture: Hip flexion limited to 60 degrees, non-weight bearing for both lower extremities
- Lower extremity amputation (pre-prosthesis and prosthesis): Balance precautions due to changes in center of gravity, fall risk owing to phantom limb sensation and balance deficits- while maintaining skin integrity. Refer to Liko Safety Harness for use with the Golvo, Viking and Overhead Track Systems and Sabina with Safety Vest. Non-weight bearing patients may require the use of an amputee sling or total body sling.

*Please refer to Liko pictorial reference material: Hip factors with Liko slings and Accessories and the Resident Functional Assessment form for additional information.

Activities of Daily Living

An occupational therapist at some point will need to assess a patient's activities of daily living or ADLs. Activities of Daily Living are divided into several headings with each heading comprised of many categories. For the purposes of this document, the intention is to focus on two main categories: functional mobility and personal care.

Functional Mobility

- Move in bed: Shift position, turn, sit
- Transfer: Bed, Chair, Bathtub, Shower, Car
- Sit in Chair
- Stand
- Walk: Level surface, environmental terrain, ramps, curbs, stairs
- Community Mobility: Get in or out of residence, cross street, around neighborhood, to bus stop.
- Work-related: Bending, Kneeling, stooping/ Lifting and carrying, reaching, pushing and pulling, manipulating.

Personal Care

- Bathe: Upper body-face, hands, arms, trunk and Lower Body-groin, buttocks, upper legs, lower legs/feet.
- Dressing: Upper body…..and lower body-slacks, shirt, socks stockings, brace, prosthesis
- Toileting: Wipe, flush, control bladder, control bowels.

As the patient is asked to perform each activity, consider the conditions by which there is an increased chance to the patient and/or therapist placing them at risk. Apply the appropriate safety harness in conjunction with the equipment to facilitate safe patient movement of task. Consider the questions asked during an evaluation of any one task. Factors include, but are not limited to:

- Safety (how much are the patients at risk?)
- Efficiency of action (executes action and is that an acceptable outcome?)
- Rating of difficulty (by patient)
- Pain (by patient) that interferes with performance
- Fatigue (sensation of tiredness, weariness or exhaustion experienced during and/or after an activity

- Duration or time needed to complete the activity
- Satisfaction (the pleasure or contentment of one's performance)

Below is a list of possible conditions that have risen and the Liko equipment most commonly utilized for safe progression toward complete independence of the task.

- Patient performing walking may refuse, stagger, weave, pace, wander or fall deliberately. Liko Golvo, Viking, Overhead patient track systems.
- Patient drops down while going to sit in a chair. -Liko Sabina
- Patient has difficulty standing-may have difficulty getting feet under the body-Liko Sabina
- Patient has difficulty transferring him or her self. The patient grabs on to clothing of caregiver or drops during standing pivot. -Liko Sabina
- Patient needs to adapt to standing postures -Liko Sabina
- Patient exhibits visual field impairments, fatigue and decreased endurance, difficulty positioning themselves onto a toilet seat and difficulty cleaning afterward-Liko Sabina with possible progression into Liko Golvo, Viking, or Overhead patient track systems.
- Patient exhibits difficulty during tub transfers, unstable when reaching to don or doff lower body clothing items- Liko Golvo, Viking, or Overhead patient track systems.
- Patient is unable to move safely, efficiency or without difficulty or pain during bed mobility/wheelchair transfers or transfers to the bathtub bench, easy chair or car-Begin with Liko Sabina with progression into Liko Golvo, Viking, or Overhead patient track systems.
- Patient is unable to manipulate or transfer objects while standing or ambulating- Liko Golvo, Viking, or Overhead patient track systems.
- Patient fatigues (inadequate endurance) before reaching required distance from bed to bathroom- Liko Golvo, Viking, or Overhead patient track systems.
- Patient is at a higher risk for falls due to poor judgment. Liko Golvo, Viking, or Overhead patient track systems.
- Patient did not make it to the bathroom in time. -Liko Sabina to practice standing tolerance.
- Patient may move in awkward manners (spasticity, ataxia, gait disturbance) Liko Golvo, Viking, or Overhead patient track systems.
- Patient may not remember own limitations, thus be at risk for falls-Liko Golvo, Viking, or Overhead patient track systems.