



## **Procedure: Muscle Flexibility and Stretching**

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### **Definition of Procedure:**

**Flexibility:** the ability to move a joint through a series of articulations in a full non-restricted, pain-free range of motion (ROM).

**Stretching:** techniques used to lengthen shortened soft tissues at the musculotendinous units to facilitate an increase in ROM.

Stretching has an impact on both contractile and non-contractile soft tissues. Passive stretching to the elastic limit can allow these tissues to resume the original resting length. Passive stretching beyond the elastic limit into plasticity will lead to a greater soft tissue length compared to the original resting length when the stretch is removed. Prolonged lengthening of the contractile units of muscle, the sarcomeres, into the plastic ROM progressively leads to increased soft tissue length due to an increased number of sarcomeres in series. Non-contractile units of muscle are ligaments, joint capsule, and fascia which all consist of collagen and elastin fibers. Prolonged lengthening of collagen up to its yield point leads to tissue lengthening due to permanent tissue deformation. Elastin fails without deformation with high loads. The more elastin the tissues contain, the more flexible the tissues. To avoid damaging soft tissues, healing and remodeling time must be allowed between periods of stretching.

### **Indications:**

- Essential for establishing normal ROM of joints and soft tissue
- Important decreasing risk of injury to the musculotendinous unit
- Prevent contractures and adaptive shortening
- Combats the effects of prolonged immobilization
- Optimal flexibility will reduce stresses to surrounding joints and tissues

### **Contraindications: Do not stretch...**

- Around acutely inflamed or infected joints
- Patients who are already hypermobile
- Patients when shortened muscles are providing stability if normal joint stability is decreased or assists with functional abilities such as in persons with paraparesis
- Across a joint when a bony block prevents motion

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### **Guidelines and Precautions:**

- It is optimal to warm up before stretching vigorously
- To increase flexibility, the muscle must be overloaded or stretched beyond its elastic ROM, but not to the point of pain
- Exercise caution when stretching muscles around painful joints
- Avoid over-stretching ligaments and capsules that surround joints
- Use caution if history of steroid use
- Use caution stretching patients with known or suspected osteoporosis, or who have been on prolonged bed rest
- Ballistic stretching should be done only by patients who are already flexible
- Stretching should be performed at least 3 times per week, but between 5 and 6 will yield maximal results
- Use caution stretching patients with frail integument
- Use caution stretching older patients because their collagen loses its elasticity and they have reduced capillary blood supply.

**Equipment / supplies needed:** Occasionally towels, buttress material, or straps are used to fixate or position a body part.

### **Stretching Methods:**

**Static Stretch:** involves stretching a muscle to the point of discomfort and then holding it at that point for an extended period of time. Can be held between 3 and 60 seconds. Optimal stretch time is between 15 and 30 seconds.

#### *Advantages:*

Prolonged low load will best facilitate a long lasting change in ROM  
Least likely to exceed the limits of the tissue extensibility  
Requires less energy expenditure  
Produces minimal muscle soreness

**Ballistic Stretch:** dynamic, rapid action of repetitive bouncing motions applied to the muscle being stretched. The antagonistic muscle group of the muscle being stretched initiates the motion. It is an effective technique for athletes but creates increased chance of muscle soreness and injury. Uncontrolled force and proposed neurologic inhibitory influences of rapid stretch may cause injury.

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**Proprioceptive Neuromuscular Facilitation (PNF) Stretching Techniques:** The first three of the following techniques incorporate use of the stretch reflex. All muscles contain mechanoreceptors that when stimulated, stimulate the central nervous system. The muscle spindles and the Golgi tendon organs are sensitive to changes in length. Muscle spindles immediately increase muscle tension in response to an increase in length and fire for at least 6 seconds. The Golgi tendon organs override the muscle spindles after 6 seconds and cause reflex relaxation of the antagonistic muscle allowing extensibility limits to be extended.

1. **Hold Relax (HR):**

- a. Passively move limb until the comfortable end range
- b. 6-10 sec sub-maximal isometric contraction of the antagonist (muscle to be stretched) against resistance
- c. This is followed by a concentric contraction of the agonist combined with light pressure from the therapist for a maximal stretch on the antagonist for 6-10 sec
- d. Repeat b. and c.

2. **Contract Relax (CR):**

- a. Passively move limb until the comfortable end-range
- b. 6-10 sec sub-maximal contraction of the antagonist (muscle to be stretched) isotonicly against the resistance of the therapist
- c. The antagonist relaxes as the therapist moves the limb passively through as much ROM as possible returning to end-range for 6-10 sec
- d. Repeat b. and c.

3. **Slow Reversal-Hold-Relax (SRHR), also Contract-Relax-Agonist-Contraction (CRAC):**

- a. Passively move limb until the comfortable end range
- b. Isotonic contraction of the agonist
- c. Followed by isometric contraction of the antagonist (muscle to be stretched) for 6-10 sec
- d. Repeat b. and c.

4. **Rhythmic Initiation:** indicated when tone or muscle spasm is sensitive to stretch.

- a. Full PROM into the direction desired
- b. Commands are given “Relax let me move you,” followed by “now you do it with me.”

5. **Rhythmic rotation:** indicated when tone or muscle spasm is sensitive to stretch.

- a. Supported full PROM into the direction desired
- b. Rotation of the body part alternately in both directions in a slow rhythmic manner around a longitudinal axis for 10 sec
- c. The command to “Relax and let me move you.” is given

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- d. Once relaxation is achieved, the limb is moved passively or actively into the newly gained range.

### **Patient Education:**

Pt should be instructed in proper techniques for self-stretching.

### **Documentation:**

- Name of muscle(s) to be stretched
- Method of stretching
- Position
- Length of time stretch maintained
- Frequency stretch is performed

### **Alternatives:**

Stretching is more effective when the intramuscular temperature is increased. Tissue heated to 103 degrees Fahrenheit is optimal and can be achieved through either therapeutic modalities or low-intensity warm-up exercises.

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### **References:**

Kisner C, Colby LA. Therapeutic Exercise: Foundations and Techniques. 1990:109-146.

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