BHARATHIDASAN UNIVERSITY

TIRUCHIRAPPALLI-620 024,

Tamilnadu, India

Programme : Master of Physical Education

Course Title: SPORTS MEDICINE

Course Code: 21MPE32

Unit -II

BASIC REHABILITATION

Dr. R. JAGATHESAN & Dr.P.PREMNATH

Guest Lecturer

Department of Physical Education and Yoga

Unit - 2

Basic Rehabilitation

Rehabilitation is defined as "*a set of interventions designed to optimize functioning and reduce disability in individuals with health conditions in interaction with their environment".*

DEFINITION OF REHABILITATION W.H.O define rehabilitation as "the combines and coordinated use of medical, social, educational and vocational measures for training the individual to the highest level of functional ability"

What is Strapping and Taping?

This is where adhesive bandages or tape (depending on the area) are used to secure or stabilize an injured or painful joint.

TAPING PRINCIPLES

1. How did the injury occur?
2. What structures were damaged?

3. What tissues need protection and support?
4. What movements must be restricted?
5. Is the injury acute and chronic?
6. Is immobilizations necessary at this stage?
7. Are you familiar with the anatomy and biomechanics of the parts involved?
8. Are you familiar with technique?

Taping Precautions and Contraindications

Kinesiology taping contraindications and precautions include:

1. Should not be applied on acute injuries unless properly diagnosed.
2. Not recommended for patients with a fever.
3. Not recommended over broken or damaged skin.
4. Care is required during pregnancy. Treatments can be highly beneficial during this time only after consultation with a treating therapist.
5. Dangerous with thrombosis as the thrombus may release via the arterial system.

6. Care required when taping patients with heart conditions as increased lymph flow will generate additional fluid load on the heart.

DEFINITION (**Proprioceptive Neuromuscular Facilitation (PNF)**

Proprioceptive: having to do with any of the sensory receptors that give information concerning movement and position of the body.

Neuromuscular: involving the nerves and muscles

Facilitation: making easier

What is Proprioceptive Neuromuscular Facilitation (PNF)?

PNF is a form of stretching designed to increase flexibility of muscles and increase range of movement. PNF is a progressive stretch involving muscle contraction and relaxation. Your physiotherapist will gently stretch the muscle and you will resist the stretch by contracting the muscle for about 5 seconds. Your physiotherapist will indicate the force of contraction required and this depends on the condition of the muscle. You then relax the muscle and your physiotherapist will

gently stretch the muscle further for about 30 seconds. There is then about 30 seconds rest and the process is repeated again several times.

PNF techniques

1. Hold-relax

One PNF technique that Black says can trigger the reflex is commonly called "hold-relax." This involves:

- Putting a muscle in a stretched position (also called a passive stretch) and holding for a few seconds.
- Contracting the muscle without moving (also called isometric), such as pushing gently against the stretch without actually moving. This is when the reflex is triggered and there is a "6- to 10-second window of opportunity for a beyond 'normal' stretch," Black says.
- Relaxing the stretch and then stretching again while exhaling. This second stretch should be deeper than the first.

2. Contract-relax

Another common PNF technique is the contract-relax stretch Trusted Source. It is almost identical to hold-relax, except that instead of contracting the muscle without moving, the muscle is contracted while moving. This is sometimes called isotonic stretching.

For example, in a hamstring stretch, this could mean a trainer provides resistance as an athlete contracts the muscle and pushes the leg down to the floor.

3. Hold-relax-contract

A third technique, hold-relax-contract Trusted Source, is similar to hold-relax, except that after pushing against the stretch, instead of relaxing into a passive stretch, the athlete actively pushes into the stretch.

For example, in a hamstring stretch, this could mean engaging the muscles to raise the leg further, as the trainer pushes in the same direction.

Regardless of technique, PNF stretching can be used on most muscles in the body, according to Black. Stretches can also be modified so you can do them alone or with a partner.

SLOWREVERSALTECHNQUES:-

Slow reversal (SR) involves dynamic contraction of the antagonist slowly followed by dynamic contraction of the agonist. Slow reversal hold (SRH) employs dynamic contraction followed by isometric contraction of the antagonist, finally followed by the same contraction sequence for the agonist.

This technique helps to increase strength of weak agonist muscles, active ROM develops coordination by smooth reversible movements helps to reduce fatigue of exercised muscle and increase endurance.

Isotonic Exercises:

In this type of exercise, thereis no change in the muscle tone or degree of muscle tension throughout the exercise.In simpler terms, during these exercises, the muscle contracts and causes the body part to which it is connected to move. These exercise result in a change in the joint angle that the muscle crosses. A bicep curl results in bending and straightening of the elbow joint. Typically, isotonic exercises are more vigorous types of exercises such as cycling, swimming, running, tennis, etc. In general, isotonic exercises tend to burn more calories, improve bone density and lower risk of heart disease. Isotonic exercises can be further classified by the type of contraction that occurs in the muscle.

The Benefits of Concentric Exercises Include:

Allows for specific muscle strengthening and repair of muscle damage

1. Improvement in the range of motion in the joint and muscles exercised
2. Improvement in strength in the muscle exercised.

Isometric Exercises

Isometric exercise is a type of low-impact exercise that involves straining your muscles without moving or bending your joints. A prime example is holding your body in a plank position – you stay at the top of a push up without bending your elbows.

Isometric exercises are good for maintaining your strength and stability. For instance, if you train by doing a plank pose, it can help you hold a plank position for an extended period of time, but won't necessarily help you do more pushups. Isometric exercise is often recommended for people who are recovering from an injury, or who suffer from joint pain like arthritis. Evidence is growing that isometric exercise may help lower blood pressure as well.

Benefits of Isometric Exercises:

- Can be used in cases of arthritis when joint movement is painful
- Used to heal injured muscles without much strain being placed on the joints
- Improves muscle strength and size
- Less chance of injury when performing these exercises
- Ability to isolate certain muscles to allow for strength training and muscle healing
- Increased bone density
- Increase in lean muscle mass

- Decreased blood flow during the prolonged muscle contraction may contribute to increased muscle growth because growth factors remain in the muscle tissues longer
- Holding the contractions longer increases muscle mass
- Increasing the number of contractions increases muscle strength

Isokinetic Exercise

In this exercise, usually machines are used which control the speed of the muscle contraction within a specific range of motion. Essentially, these machines can control the resistance placed on the muscles and keep the speed of the muscle movement fairly constant. These machines combine the benefits of isotonic and isometric exercises. Examples of these machines include the stationary bicycle, and the Cybex arm machine.

Benefits of Isokinetic Exercise:

- Used to rehabilitate muscles
- Uses uniform resistance that adapts to the body
- Less stressful on the body
- Increases range of motion without muscle fatigue or muscle strain
- Muscles are allowed to rest which avoids lactic acid build up

Difference between isometric, isotonic, and isokinetic exercises

One way to remember the difference between isotonic, isometric, and isokinetic exercises is to look at the meaning of the original Greek roots of each word.

- Isometric means "**same length**," so that your muscles do not get longer or shorter by bending a joint.
- Isotonic means "**same tension**" so that the weight on your muscles stays the same.
- Isokinetic means "**same speed**" so that your muscles are contracting at the same speed throughout the workout.

Stretching

Stretching, as it relates to physical health and fitness, is the process of placing particular parts of the body into a position that will lengthen, or elongate, the muscles and associated soft tissues.

Stretching is a general term used to describe any therapeutic maneuver designed to increase the extensibility of soft tissues, thereby improving flexibility by elongating (lengthening) structures that have adaptively shortened and have become hypomobile over time

Active Stretching

Active stretching involves holding a pose to utilize a targeted muscle group. For example, an overhead stretch can target your shoulders, chest, forearms, and lats. Active stretching is commonly performed as a warm-up to prepare the muscles for exercise.

Passive Stretching

This type of stretching is best for balance enhancement and flexibility. For example, stretching your hamstrings by bending over and stabilizing your legs can foster flexibility by staying in that position for a set period of time. Passive stretching is commonly utilized in Yoga.

Dynamic Stretching

Dynamic stretching is achieved on movements with momentum, rather than a static stretch. An example of dynamic stretching would be moving your arm in a full rotation to stretch your shoulder repeatedly. Each pass is a stretch to activate the muscles and increase flexibility.

PNF Stretching

PNF (short for proprioceptive neuromuscular facilitation) stretching is an assisted stretching method, involving laying on a table, with the help of a certified specialist. PNF stretches are very

focused, similar to passive stretching, and the physical therapy specialist will hone in specifically on target muscles by holding you in position.

Advantages, dangers of stretching

Advantages

- Improve your performance in physical activities
- Decrease your risk of injuries
- Help your joints move through their full range of motion
- Increase muscle blood flow
- Enable your muscles to work most effectively
- Improve your ability to do daily activities

Dangers of stretching

1. **Prevent injuries**

   Interestingly, stretching does not prevent injuries. A review of the research on the topic found that stretching, particularly static stretching and PNF, does not seem to have a significant impact on the risk of injury.

2. **Does not directly improve mobility**

   Flexibility isn't mobility. So doing stretching does not necessarily improve mobility. However, stretching will help maintain and increase ROM if it is regularly practiced. In order to improve mobility, you need to work on improving the range of motion without assistance specifically.

3. **Stretching does not prevent, relieve muscle soreness, or aid in recovery post-workout**

   Contrary to popular belief, stretching does not prevent muscle soreness after a workout according to research. In fact, a recent study showed that static stretching actually increases the amount of muscle soreness you experience after a workout.

4. **Can't stretch the pain away**

   While evidence shows that stretching can assist in alleviating certain aches such as back pain and shoulder pain, it's best not to rely solely on stretching to rid yourself of pain altogether.

Muscle Strength Testing and Manual Muscle Grades

Muscle strength is a common area evaluated when patient first come to rehabilitation. Most practitioners use manual muscle testing devices like hand held dynamometers to get results for muscle strength. These scores are then graded according to a guide published by the published by the National Institute of Health. These grades provide valuable information to practitioners as to where a patient falls within established norms for functional movement, while providing a valuable tool to keep track of progress as the patient moves forward with rehab.

MANUAL MUSCLE TESTING PROCEDURES

Key to Muscle Grading

	Function of the Muscle	Grade		
No Movement	No contractions felt in the muscle	0	0	Zero
	Tendon becomes prominent or feeble contraction felt in the muscle, but no visible movement of the part	T	1	Trace
Test Movement	**MOVEMENT IN HORIZONTAL PLANE**			
	Moves through partial range of motion	1	2-	Poor-
	Moves through complete range of motion	2	2	Poor
	ANTIGRAVITY POSITION	3	2+	
	Moves through partial range of motion			
Test Position	*Gradual* release from test position	4	3-	Fair-
	Holds test position (no added pressure)	5	3	Fair
	Holds test position against slight pressure	6	3+	Fair+
	Holds test position against slight to moderate pressure	7	4-	Good-
	Holds test position against moderate pressure	8	4	Good
	Holds test position against moderate to strong pressure	9	4+	Good+
	Holds test position against strong pressure	10	5	Normal

MMT grades are usually labeled with the following terms: “zero,” “trace,” “poor,” “fair,” “good,” and “normal.” In addition, manual muscle testing grades can be further described using a numerical scale from 0 through 5. To further fine-tune grading, practitioners may also use + or – symbols to fine-tune the grading specific to their patient’s unique testing results.

For all practices and practitioners, it’s important to have a degreed upon protocol for performing manual muscle testing in order to get reliable results across the board. When using MMT grades, 0 is on the low-end of ability while 5 is the higher end of strength ability. For example, when using MMT grades, the Fair or neutral results are considered a 3 if the patient is able to move the tested body part throughout the range of motion, either against gravity and/or has the ability to maintain the testing position. Patients who aren’t able to move through the full range of motion, unless gravity is removed, will score lower on the scale with a “poor” grade or 2. Then for our patients who are unable to move throughout the range of motion, with or without range of motion, would be considered a 0 grade.

Using Manual Muscle Testing Grades

THE MMT Grades Guide

Grade 5 (Normal; 100%): With a grade 5, patients are able to withstand any added pressure within the test position while completing a full range of motion movement against any added gravity (and maximum resistance applied at end-range).

Grade 4 (Good;75%): With a grade 4, patients can only successfully perform the full range of motion during testing with moderate pressure. Grade 4 is usually only given if a patient can perform with moderate-strong pressure on both sides, to ensure enough force was used on the tested limb.

Grade 3+ (Fair+): MMT grade 3+ is not quite middle of the road results. In this grade, a patient is able to perform complete range of motion with the addition of gravity and minimal resistance.

Grade 3 (Fair;50%): Manual muscle testing grade 3 is considered the mid-range for muscle strength. In this grade, the patient can complete the complete range of motion against gravity, however, will be unable to perform the test with any added pressure.

Grade 2+ (Poor +): Grade 2+ is the beginning of strength ranges where there is a marked deficit in strength. There are two sides to this grade. A patient is considered an MMT grade 2+ if they move through 50% or less in range during an anti-gravity position or is only able to maintain the position against resistance, but without gravity.

Grade 2 (Poor;25%): With Grade 2, patients can complete movement in a horizontal plane during muscle testing, however they are unable to complete any type of movement when gravity is applied. However, once gravity and/or resistance is eliminated, they are able to perform the required movement.

Grade 2- (Poor -): With Grade 2-, patients can only move partially in a horizontal plane. The distinction with this grade is that movement can only be performed partially and only when both gravity and resistance has been eliminated.

Grade 1 (Trace): Grade 1 is the last of the manual muscle grades and indicates that there is no visible movement on the tested body part. There may be small contractions upon closer examination and/or palpation, but it will be minimal. In muscle testing, with this grade, patients are unable to move the tested body part at all regardless of the lack of resistance or gravity.