Supportive Living Inc.

Creating and Implementing Dynamic Stretching Plan for Individuals with Limited Range of Motion

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Introduction

Supportive Living Inc. (SLI) is an institution that focuses on providing opportunities and services for individuals who experienced Traumatic Brain Injuries (TBIs), Acquired Brain Injuries (ABIs), and/or have Neurodegenerative Disorders. Their focus is to help improve these individuals' quality of life by providing affordable housing, community-based wellness programming (i.e., their Neuro-Fit program), etc.

- Their Neuro-Fit Program provides evidence-based exercise classes for individuals living with functional limitations caused by brain injury or other neurological conditions.
- Each one-hour sessions feature aerobic exercises to help improve/challenge:
- Cardiovascular fitness
- Strength and mobility
- Balance and gait exercises
- One on one instruction is provided for all participants to help them work towards specific and individualized fitness goals.
- For five consecutive weeks, three participants from SLI Neuro Fit program who attend Cape Ann YMCA located in Gloucester implemented 2 dynamic exercises before each session.

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Objectives

- Participants will implement (2) two dynamic exercises, prior to their regular workout program, that focus on improving overall mobility and range of motion. These exercises will be implemented for a (5) week period. The goal is to determine if the new exercises make a difference in the way the participants feel relative to their increased movement through their workout program.
- A questionnaire will be administered individually to the (3) participants prior to the implementation of the new exercises. The questions will determine the current range of motion in areas of concern and the level of current pain for each participant. Range of motion will be measured in degrees and overall comfort level.

Related Research

- "Traumatic brain injury (TBI) is a major cause of morbidity, hospitalization, and disability in the United States. TBI may be caused by motor vehicle accidents, acts of violence, and unintentional blunt trauma" (Klima, 2019).
- "Individuals recovering from injury present with a variety of cognitive and neuromotor deficits, including memory loss, dizziness, gait deviations, and balance dysfunction" (Klima, 2019).
- "Stretching can maintain joint flexibility and Range of Motion (ROM), thereby effectively decreasing the risk of injury and increasing the quality of body movement" (Zhou, 2019).
- "Dynamic stretching (DS) can also improve joint ROM, achieve the warm- up effect relatively quickly, promote flexibility, and decrease passive muscle tension" (Zhou, 2019).
- "Compared to healthy sedentary persons, reduced values of maximal aerobic capacity are 25 to 30% lower and can be increased by the use of adapted physical exercise that improves the cardiorespiratory capacity of a patient with TBI. The use of an aerobic exercise program has been shown to not only improve cardiovascular and endurance performance, but also influence cognitive function in patients with TBI, that is, the better functioning of the brain structures in which the processes of memory and learning take place has been observed"(Romanov, 2021).
- "Muscle ability (strength, endurance) is significantly correlated with coordination and balance. Poor balance and spasticity are the main causes of mobility restriction. They are related to insufficient production of muscle strength and identified in a patient after a TBI. Strength exercises increase muscle mass, provide better stability and coordination, and can further prevent falls. Strength exercises affect muscle trophism, body awareness and perception, as well as improvement of nervous system function"(Romanov, 2021).

Methods

-A 5-question interview was conducted individually among 3 participants to gain qualitative data before and after the implementation of the dynamic exercises.
-The data was compared before and after implementation of the stretches to highlight improvements made throughout the program.
-With the data from the dynamic exercises being implemented, a table was created to visually show the progression of sets and repetitions for each exercise.
-Initial measurements were taken during week 1 for each dynamic exercise were taken (in inches or degrees) and then compared to measurements taken in week 5.

Interview Results

-Each participant was asked 5 questions regarding their baseline pain level, goals they have for their program, their prior experience implementing stretching before this point, and satisfaction level of current exercise plan.
-Most of the participants' pain/discomfort level were at a 2 located in their lower extremities.
-All participants experienced stretching the lower extremities with a physical therapist (PT) prior to the exercise program and had goals to improve balance and gait, mobility, and strengthen lower extremities.
-All participants were very satisfied with the exercise program so far and were eager to try new exercises.

Implementation

Dynamic Exercises	Week 1	Week 2	Week 3	Week 4	Week 5
Walking Hip Marches *	2 lengths of turf w/ rollator **Initial measure**: ^11 Inches from the ground	2 lengths w/ cane	4 lengths w/ cane	2 lengths w/o cane	4 lengths w/o cane **Updated measure**: ^15 inches from the ground
Trunk Twists (unsupported) **	3 sets and 10 reps w/ 6lb. ball **Initial Measure**: ^45-degree ^^25-degree ^^^50-degree	3 sets and 15 reps w/ 6lb. ball	3 sets and 15 reps w/ 6lb. ball	2 sets and 10 reps w/ 8lb. ball	2 sets and 12 reps w/ 8lb. ball **Updated Measure**: ^60-degree ^^55- degree ^^^70-degree
Shoulder Flexion ***	3 sets and 10 reps Touch pen 1ft. away **Initial Measure**: ^^80- degree ^^^100- degree	3 sets and 12 reps Touch pen 1 ft. away	3 sets and 12 reps Touch pen 2 ft. away	3 sets and 10 reps Touch pen 3 ft away	3 sets and 12 reps Touch pen 4 ft. away **Updated Measure**: ^^110- degree ^^^135- degree

* = Participant 1 only	^ = Participant 1
** = Participants 1,2, and 3	^^ = Participant 2
*** = Participants 2 and 3	^^^ = Participant 3

Conclusion

Based on the results, it can be concluded that starting off with dynamic exercises before implementing a controlled exercise program can benefit individuals with limited range of motion.

-After conducting individual interviews for all 3 participants, the responses from before and after implementation of dynamic exercises were compared.
-Below are the themes that arose from the comparison of the responses of both interviews:

-Pain levels were similar overall, however dynamic exercises helped with discomfort and mobility.
- "Feels easier to walk and move my back after the dynamic exercises"(participant 1)
- "Yes, the dynamic exercises reduced pain in my back"(participant 3)

-Implementation of dynamic exercises helped participants achieve their exercise goals.
- "I am able to move around better, and I definitely have more mobility to do chores at home by myself" (participant 1)
- "The dynamic exercises make me feel looser, not as stiff. Therefore, making exercising easier" (participants 3)

- Throughout the exercise program, participants have seen significant improvement with the help of dynamic exercises.
  - "Practicing core more helped increase mobility and ADL's" (participant 2)
  - "At the beginning of the program, I couldn't get off the toilet without my husband's help. Now I just shift my weight and do it myself! Dynamic exercises showed a huge change in my overall exercise"(participant 3)

-Each participant's reflection on the progression of their neuro-fit program (including the dynamic exercises) showed continuous improvement in lower body and core mobility and strengthening balance and gait.
- "I noticed I have more energy. I baked thanksgiving morning, and I can stand longer without holding on during choir practice" (participant 1)
- "I am able to move around better and complete my chores more efficiently due to the core exercises" (participant 2)
- "I can stand and sit longer, due to the exercises helping with my back pain" (participant 3)

Recommendation

- The implementation of dynamic exercises before doing initial exercise plan for five weeks has shown improvement in lower body mobility, balance and gait, and overall range of motion among 3 participants.
- Therefore, dynamic exercises should be implemented among each participant before their exercise plan at Supportive Living.
- Implementation of dynamic exercises before executing exercise plan will increase flexibility, help loosen and warm up muscles, and decrease risk of injury which will be very beneficial to individuals who work out regularly but also specifically to those who are dealing with underlying conditions like Traumatic Brain Injuries (TBIs), Acquired Brain Injuries (ABIs), and Neurodegenerative Disorders.

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