Physical Therapy Department

Resistance Training Intensive Guideline

**Objective:** Establish guideline for implementing resistance training intensive programs at CHCO; Explain purpose of program and potential patient populations expected to benefit; and establish guidelines for carrying out the program.

**Who Will Benefit:**

This program is recommended for patients who are highly motivated to improve physical performance. Participants must be able to easily follow verbal direction, need minimal re-direction to maintain focus on intensive exercise activity, and have motivation to participate in physically demanding activity. Participants should be primarily children who are ambulatory with or without an assistive device at a recommended age of 9 years old and above (however children as young as 3 are able to participate and benefit). Prospective participants are likely to have transitioned out of weekly, developmental focused therapy, but children who meet previously described criteria and are interested in achieving specific, functional goals should be referred for evaluation.

**Program Description:**

An intensive therapy program focusing on improving muscle power and maximal strength to improve specific functional standing, transitional movement, ambulation, and higher level motor and community access goals.

- Initial assessment with specific outcome measures and goals established before start of intensive and outcome measures completed again at initiation of intensive
- Mobility limiting ROM issues, equipment, and orthotic decisions should be handled before or after intensive
- Children that participate in the intensive are likely not to continue in an ongoing weekly therapy program after completion of the intensive. The intensive is to be incorporated into a model of therapy where consultative follow-ups are done throughout the year and therapy frequency is adjusted on an individual basis depending on patient’s needs and goals. Significant efforts should be made to assist family and child to access a community recreation program.
- Program dosing: 8-12 weeks in duration, 2-3 visits per week frequency, Sessions 45 - 60 minutes in length (dependent on what is incorporated into the sessions to address specific, individual goals)
- Plan of care will adapt to address patient/family needs, schedule, motivation, and goal achievement.
  - Example 1: Complete 2x/week for 8 weeks resistance training intensive incorporating individualized activity areas during summer followed by a mini-intensive in winter for 8 weeks, (2x30 minute sessions just focusing on one primary area).
  - Example 2: Complete 2x/week for 8 weeks resistance training intensive incorporating individualized activity areas followed immediately by 3x/week for 4 week gait/balance intensive as determined by child progress/motivation and availability.
Example 3: Complete 2x/week for 8 weeks resistance training intensive. Patient meets goals and transitions to community based activities such as yoga and swimming class at rec center. Patient returns on consultative basis (once every 3 months) to re-assess ROM, strength, skills, and equipment needs and update home exercise program.

**Therapy Session Example:**
- 5 minute light warm-up (treadmill, elliptical, bike, walking, etc.)
- **Choose strength training OR power training** (15-30 minutes; you can use different strategies for different muscles dependent upon functional target and role of muscle group in goal)
  - **Clinical Pearls:**
    - Add in functional electrical stimulation when there is difficulty in activating or selecting a muscle group, but do not use it to increase the strength of contraction
    - Multi-joint movements are more challenging that single joint movements. Attempt single joint movements if more complex patterns are too hard.
    - Structure session so the participant is continuously working (i.e., circuit) and that you come as close as possible to following effective resistance training dosing guidelines.

<table>
<thead>
<tr>
<th>Strength Training</th>
<th>Power Training</th>
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<tbody>
<tr>
<td><strong>Intensity:</strong></td>
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<tr>
<td>- Determine 1 repetition maximum through actual determination or estimate</td>
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<tr>
<td>- 85% of 1 rep max</td>
<td>- 40% to 80% of one rep max</td>
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<tr>
<td>- 6-8/10 modified Borg RPE or Omni Resistance Training Scale</td>
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<tr>
<td><strong>Muscle Groups:</strong></td>
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<tr>
<td>- Typically focusing on anti-gravity LE musculature (glutes, quads, calves)</td>
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<tr>
<td><strong>Volume:</strong></td>
<td></td>
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<tr>
<td>- 3 sets of 6-8 repetitions</td>
<td>- 6 sets of 6 repetitions</td>
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<tr>
<td><strong>Rest:</strong></td>
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<tr>
<td>- 30 seconds to 1.5 minutes between efforts</td>
<td>- 2-5 minutes between efforts</td>
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<tr>
<td><strong>Progression Determination:</strong></td>
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<tr>
<td>- Increase weight incrementally once 3 sets of 6-8 reps at 85% of one rep max can be achieved.</td>
<td>- Increase weight incrementally once 6 sets of 6 reps at 40%-80% of one rep max can be achieved</td>
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<tr>
<td>- Borg modified RPE/Omni RPE Scale &lt;6/10</td>
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<tr>
<td><strong>Progression:</strong></td>
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<td>- Incremental weight increase can be done by increasing weight slightly or by increasing weight for the first few sets and maintaining previous weight if unable to complete volume</td>
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<tr>
<td>- Attempt for 3-5% weight increases</td>
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<tr>
<td>- Continue this process of incrementally increasing weight throughout the program</td>
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<tr>
<td><strong>Form and Fatigue:</strong></td>
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<tr>
<td>- Fatigue determined by inability to control weight or unacceptable breakdown in biomechanics</td>
<td>- Fatigue determined by inability to control weight, unacceptable breakdown in biomechanics, or markedly decreased speed in concentric motion</td>
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<tr>
<td>- Participant should experience high degree of muscle fatigue during last 3-4 repetitions of last set</td>
<td>- Participant should experience high degree of muscle fatigue during last 3-4 repetitions of last 2 sets</td>
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<tr>
<td>- Participant likely to initially experience exaggerated degree of perceived exertion, so use mechanics as primary guide</td>
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• Provide minimal physical assistance to help maintain alignment if needed and ALWAYS provide a spot to ensure safety

**Specificity Determination:**
• Use strength training to specifically increase underlying muscle bulk for stability or slow and controlled functional movement goals or when base level strength needs developed

**Specificity Determination:**
• Use Power training when goals are centered around power activities such as walking speed, balance, running/jumping, standing transitional movements, stair negotiation, and efficiency

- **Treadmill Training:** 10 minutes max
  - Focus on increasing quality, speed and/or power *not endurance!*
  - 5 to 10 minutes maximum, interval training suggested. Walk or run as fast as possible for 1-2 minutes with 1 minute walk at slower speed and repeat.
  - Body weight support or hands on railings to provide assistance for balance and unweighting while working on power/speed/quality training
  - Vary speed/incline to continue to make it a novel task to incorporate neuromuscular learning
- **Core/Balance/Functional Training:** 10-15 minutes
  - Dynamic balance activities
  - Rebounder in tall kneel, ½ kneel, ½ stance, or other balance challenge
  - ½ stance with varied surface to challenge balance
  - Incorporate weighted balls and weight bars into functional activity
- **Functional Strengthening/Intensive Skill Practice**
  - Step-ups - vary surface height
  - Resisted walking - forwards, backwards, sideways, obstacles
  - Resisted stepping - focusing on stability on one leg with mobility on opposite leg.
  - Provide resistance accordingly depending on what you are working on. Less assistance if working on stability and functional activities
  - Sit-to-stand, floor-to-stand or other functional challenges
  - Hopping, jumping or running as indicated

**Outcome Measures:**
- Refer to June 2017 training day pdf or seek assistance from Jim Hedgecock, Nickie Harris, Kerry Mikolaj, Zach Varsos, or Kelsey Miller
- Outcome measurement is a required component of physical therapy care and an essential indicator and tool to determine intervention effectiveness and further plan of care for children with neuromotor diagnoses. Use the following as a guide:

  **Flowsheet: PT Resistance Training Intensive**
  **Required (for children with cerebral palsy):**
  - Patient Specific Functional Scale (3-5 functional or participation based goals)
  - Gait speed (m/s)- Self-selected (average of 3 trials)
  - Gait Speed (m/s)- Fast (average of 3 trials)
  - GMFM 66 (Item Set or Basal/Ceiling, stay consistent within intensive period)
  - 1 minute walk test (meters)
  - Functional Strength Testing Battery (if accommodations are used, stay consistent)
    - 30” sit-to-stand
    - 30” lateral step-up - Left
    - 30” lateral step-up - Right
    - 30” 1/2 kneel-to-stand - Left
    - 30” 1/2 kneel-to-stand - Right
- Muscle Power Sprint Test (watts)
  Optional *for children with cerebral palsy or for use with children with another diagnosis*:
  - Four square step test
  - Timed up and down stairs
  - Timed floor to stand natural
  - Timed up and go (modified, wall tap)
  - 6 minute walk test
  - 5 time sit to stand
  - Functional reach (toes to fist, two hand)

**What happens after intensive program is complete?:**

To maintain improvements in function, it is important to assist family with incorporating the new skills into their daily routine. Older children are encouraged to join a gym or recreational activity that will help maintain or improve strength, fitness, and function. Younger children may need additional episodes of intensive therapy as community resources may be more limited. Additional episodes of intensive therapy may be beneficial to continue throughout the year. To avoid burn-out and provide responsible use of insurance benefits, a break in therapy should be established before returning to another intensive program. Monthly to quarterly re-evaluations or “check-ins” are recommended so that therapist and family can continue to evaluate changes in impairments, function, and participation.

Therapists can continue to guide activities and home exercise program can be updated and other equipment and impairments can be monitored and issues addressed as needed. The most pertinent outcome measures should be repeated at these times to objectively monitor changes in function. Continued intervention can be completed at clinician and family discretion if child is continuing to make progress in performance of intervention and when new, specific functional goals are identified.
References:


Hedgecock and Harris 2017
