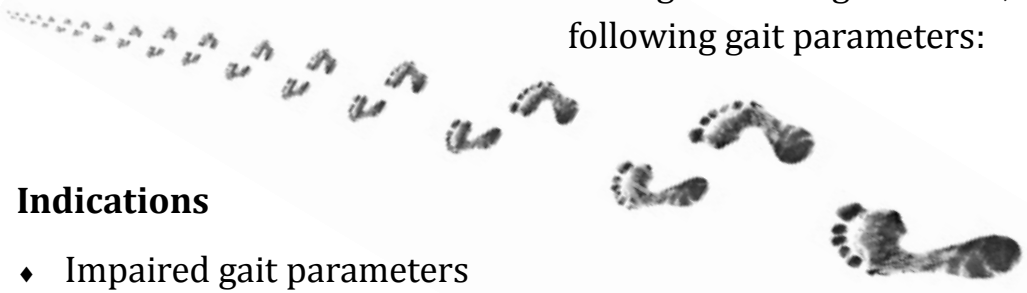
Rhythmic Auditory Stimulation and Gait Training

Post-Stroke and Post-Brain Injury

What is Rhythmic Auditory Stimulation (RAS)?

- The use of auditory cues during gait training to improve gait parameters.
- Auditory cues are provided at a specific rhythm to the individual during gait.
- The individual is instructed to match each step to the pulses.
- Focus on improving asymmetrical gait resulting from hemiparesis



Why use RAS?

After gait training with RAS, individuals post-stroke displayed improvements in the following gait parameters:

- Gait velocity
- Stride length
- Stride width
- Cadence
- Temporal Asymmetry
- Spatial Asymmetry
- Medial gastrocnemius EMG variability

Indications

- Impaired gait parameters
- Ability to walk independently with step-through gait pattern
- Cognitive ability to understand instructions and follow cues
- Ability to hear cues

Precautions/Contraindications

- Unable to safely perform reciprocal step-through gait pattern
- Limited hearing ability
- Cognitive impairments limiting ability to follow instructions

How much cuing should be provided?

- *Bilateral*—one pulse for every step

Goal: to decrease reliance upon cues and improve transfer to walking without cues

Implementation of RAS

At what speed should RAS be conducted?

- Initial: Begin near self-selected walking speed.
- Later: As able, increase speed to encourage faster than self-selected walking speed.

Resources: *Free Internet-Based Metronomes*

- Metronome Online: www.metronomeonline.com/
- Web Metronome: www.webmetronome.com/
  - Mobile app available
- Best Metronome: www.a.bestmetronome.com/
  - Mobile app available

Calculating Cuing Rate

Measure gait parameters using 10 Meter Walk Test

- Measure comfortable overground walking speed and cadence
- Measure fastest overground walking speed and cadence

Convert Units

- Meters per seconds to miles per hour if using treadmill training
- Cadence to beats per minute for metronome

Example: Speed

- 10 Meter Walk Test

  Comfortable = **20 seconds**

- Calculate speed in meters/second

  10 meters / 20 seconds = **0.50 m/s**

- Calculate speed in miles per hour

  Multiply m/s by **2.2** to determine mph

  0.5 m/s x 2.2 = **1.1 mph**

Example: Cadence

- 10 Meter Walk Test

  Comfortable = **28 steps**

- Convert steps in test to steps per second

  Divide number of steps in test by seconds needed to complete test

  28 steps / 20 seconds = **1.4 steps/second**

- Convert steps per second to steps per minute

  Steps per minute will equal beats per minute setting on metronome

  Multiply steps per second by **60**

  1.4 x 60 = **84 steps/minute = 84 beats/minute**