
JUST PUT ONE FOOT IN FRONT OF THE OTHER?

BEST PRACTICE SUGGESTIONS FOR GAIT TRAINING AFTER STROKE

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OBJECTIVES

- Identify key **common impairments**, their **functional implications**, and **appropriate outcome measures**
- **Review research** for a variety of common treatment techniques
- Suggest practical and feasible evidence-based **applications**

BACKGROUND^{1,2}

- Stroke is leading cause of long-term disability
 - most return home, almost all have some functional disability and mobility impairment.¹
- Ability to walk and engage in an active lifestyle has health implications for every person, not just patients with strokes
- Walking endurance is most commonly affected after a stroke^{1,2}

STROKE & MOBILITY₂

Walking Endurance

Gait Speed

Balance

- One year after stroke, walking endurance was most striking area of difficulty
- Subjects were able to walk only 40% of predicted ability on 6MWT

- Contributing Factors:
 - LE Strength
 - Standing Postural Sway & Balance
 - Cardiovascular Health
- NOT Correlated:
 - Spasticity, ROM, poor sensation or proprioception

STROKE & MOBILITY₂

Walking Endurance

Gait Speed

Balance

“by 3 months, there was still considerable room for improvement in all measures: 85% of participants still had impaired gait speed”

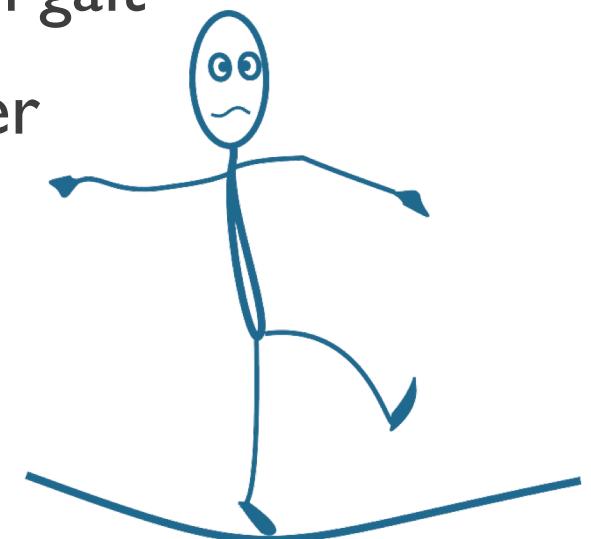
STROKE & MOBILITY

Walking Endurance

Gait Speed

Balance

- Balance on its own does not explain differences in gait
- However, walking requires dynamic balance, proper weight shifting, postural control and reactions



FUNCTIONAL IMPLICATIONS,

IMPACT ON PARTICIPATION:

- Limited Community Ambulation
- Readiness to change (motivation)
- Stages of Change (self-efficacy)
- Falls



- Gait Speed ~0.4 m/s more likely to be community ambulators
 - Increasing by >0.4 m/s resulted in increased participation
- Daily step count approximately 47% lower than **sedentary** healthy adults

TRACKING CHANGES

6MWT

SEM = 18.6 m or
4.8% change

MCID = 34.4 m

Healthy Adult =
400 m

Stroke = 200-300 m

Gait Speed

SEM = 0.07 m/s

MCID = 0.14 m/s

Cut-Off = <0.4:
household; 0.4-0.8:
limited community;
>0.8: community

TUG

SEM = 1.14 sec

MCD = 2.9 sec

Cut-Off Elderly
Stroke = >14 sec

Healthy Adult = 9.1
sec

Stroke = 22.6 sec

TECHNIQUES: NDT & PNF

I, 3-7

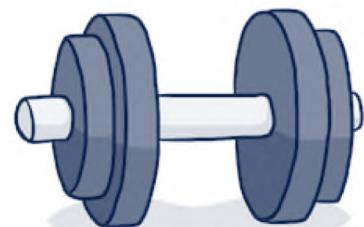
- **NDT vs LE strengthening** found both effective in step length, gait speed, and cadence³
 - only NDT improved spasticity of hip adductors
- **NDT vs conventional treatment** found greatest improvements in gait velocity (65%) and stride length (83%)⁴
- Some older evidence less clear¹
- **Systematic Review:** all studies found improved gait outcome measures with PNF⁵
- **PNF and Incline:** significantly improved Berg, FRT, and TUG compared to control⁶
- **PNF and Stair:** significantly improved Berg, FRT, and TUG compared to control⁷

TECHNIQUES: STRENGTH TRAINING I,8

- 6 weeks of **isokinetic strength training** of quads and hamstrings → improved speed, no increase in spasticity⁸
- **Systematic Review** found improvement in force generation, minimal translation to walking¹
- **Older literature says yes, newer research says minimal direct impact on walking¹**

KEEP IN MIND:

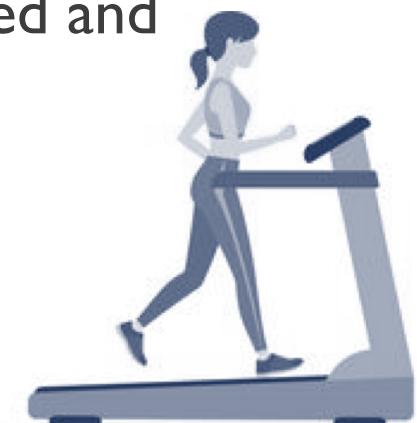
Strength training is still valuable to our patients as it decreases risk for osteoporosis, a major concern for this patient population



TECHNIQUES: TREADMILL

I, 9-12

- **Older research seems to be split¹**
 - 2005 Meta-Analysis of 15 RCTs found no significant change
 - General trend towards improved outcomes, not often significant
- **Recent Cochrane Review found significantly improved walking endurance and gait speed⁹**
- **BWSTT vs conventional treatment** found significant improvement in walking endurance (30%)¹⁰
- **BWSTT and TT combined with conventional treatment** significantly improved speed and endurance^{11, 12}



TECHNIQUES: CIRCUIT

I, 13-15

KEYS TO CIRCUIT TRAINING¹

1. graded strengthening using functional tasks
2. aerobic component
3. variety of challenging walking activities with substantial postural control
4. Intensity and challenge continually incremented for maximal challenge

- Multiple studies have found significant and sustained improvements in walking endurance and walking speed in both sub-acute and chronic stroke.^{1, 14, 15}
- **Circuit vs conventional treatment:** significant improvements in walking endurance (60.8 m on 6MWT) and gait speed (0.15 m/s) along with significant decrease in TUG time.¹³

TECHNIQUES: THERABAND ASSISTED & SIT-STAND

16-17

- **TB Assisted vs Conventional**

Treatment: found significant increase in gait in 3-6 week window, no significant difference by end¹⁷

- Challenge point?

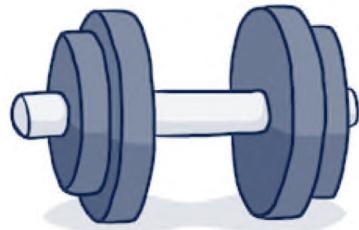
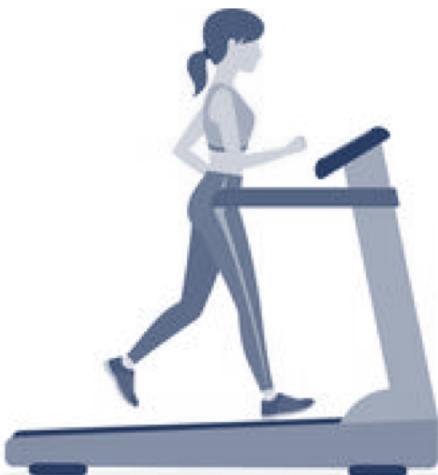


- **Modified STS vs Conventional**

Treatment: found significant improvements in Berg and DGI¹⁶

CLINICAL TAKEAWAYS

- There is no one-treatment-fits-all
- Task-Specific Strengthening
- Combination and Variation
- Circuit Training



RESOURCES

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