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PHYT 732: Evidence Based Practice

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Module 4: Evidence Table

PICO: In people with moderate-severe brain injuries, is body weight supported treadmill training more effective than conventional over ground gait training in improving kinematics of functional gait?

AD= Assistive Device; BWSTT= body weight-supported treadmill training; FAC= Functional Ambulation Category; GT= gait training, gt= gait; intvn= intervention; SL=stride length; TBI= traumatic brain injury; // bars= parallel bars; vel= velocity

Author, Year, Journal, Title	Purpose, Design	Subjects	Intervention	Outcome Measures	Stat Significant Results	Application to PICO	Comparison/ Notes
Brown et al. 2005 *J Head Trauma Rehab.* Body weight-supported treadmill training versus conventional gait training for people with chronic traumatic brain injury.	Is gait training with BWSTT more effective than COGT in the chronic TBI population? RCT	n=20; 14M, 6F; 20-57yo; 7-23y post TBI; MMSE scores 2-30	Both groups: GT 2x/wk for 14wks. Amb 15' of 30' sess. BWSTT: LiteGait; 30%BWS w/ assist of 1-3 PTs PRN at fastest speed tolerated. COGT: amb on level surface w/ AD and PT assist PRN	TUG, Functional Reach Test, FAC, Gait velocity, SL differential, step width (via GAITRite) Measured pre and post-test (within 2 wks of intvn.)	Both groups ↑ step width toward normal. BWSTT ↑ asymm SL differential; COGT ↑ symm SL differential. No change in gt vel or FAC for either group	BWSTT was found to not be more effective than COGT when provided more than 3 mo to individuals >6y post injury.	Specificity of training OG may have effect on results. Supports need to see if longer intvn period will change results. Supports needed for BWSTT testing in more homogenous group
Hesse et al. 1995 *Stroke* Treadmill training with partial body weight support compared with physiotherapy in nonambulatory hemiparetic patients	Is PBWSTT more effective than GT within regular PT in improving gt of nonamb pts with chronic hemiparesis? A-B-A Case study	n=7; 6M, 1F, avg 60.3yo (52-73yo); 3R hemi, 4L hemi; all ischemia of MCA, avg 178 days post-stroke	BWSTT phase followed by PT phase followed by BWSTT. Ea phase for 3wks (15 sess). BWSTT: 30'; 30% BWS @ .07m/s. ↓ BWS & ↑ vel ASAP to FWB & avg .2m/s . 1-2 PT assist PRN. PT: individual PT focused on GT goals & exercise program	FAC, Rivermead Motor Assessment, Motricity Index, Modified Ashworth Scale, gt speed, cadence, and stride length Measured 1x/wk	BWSTT improved FAC levels (avg 1.2pts) & gt speed more than conventional PT No superiority of tx with Rivermead, Ashworth Scale, or strength	BWSTT is more effective in restoring gt ability and walking velocity than conventional PT in pts with hemiparesis (following stroke).	Supports needed for research comparing BWSTT with conventional PT with greater emphasis on GT and longer intvn period. Possible role of spontaneous recovery.

McFayden et al. 2003 *J Head Trauma Rehab* Residual effects of a traumatic brain injury in locomotor capacity	What are the residual locomotor effects of a traumatic brain injury (TBI) on unobstructed and obstructed walking? Observational Study	TBI: n=8M; med 27.9yo; med BMI 21.90; med GCS 8; med 2.3-6mo post injury; DGI 8-15; amb >1m/s indep Control: n=4M; healthy; 22.75-44.3yo; BMI 20.23-24.7	Subjects amb 9m at natural gt speed. Infrared markers at feet, legs, thighs, pelvis, trunk, and head tracked by Optotrak system. Subjects then amb at same speed with moderate height (15% of LE length) obstacle present, stepping over with both LEs. 5 trials/condition.	Cadence, gt speed, bilateral SL, toe clearance during obstr and unobstr gt, toe-heel proximity, max joint angle duration at swing phase. TBI outcome measures: GCS, DGI, Glenrose Ambulation Index, timed 10m walk, BBS, timed SLS eyes open & closed Measured 1x at hospital admission.	↓ gt speed of obstacle avoidance, ↓ crossing speed of trail limb compared to lead limb, ↓ cadence with obstacle crossing, shorter SL, ↑ trail limb stride from unobstr. to obstr, further distance of trail leg from obstacle in those with TBI compared to control Correlation in stride length & gt speed	Those with TBI present with slower gait speeds & shorter SL compared to healthy pop. Decrease in gt speed is due to ↓ SL, not cadence. ↓ SL is due to combination of subtle changes at multiple joints, not just 1 joint.	Measure of injury severity did not provide prediction of locomotor ability Supports needed for research in independent assessment of gt speed components in TBI population, wider ranges of disabilities, and varying environments. Demonstrates more cautious gait following TBI. High functioning subjects in this study.
Ochi et al. 1999 *J Head Trauma Rehab* Temporal-spatial feature of gait after traumatic brain injury	How do temporal-spatial characteristics of gt differ in pts with TBI compared to gt in normal and the stroke population? Retrospective Case Control	n=127; 127M,45F; 31.0±10.5yo; 52 R hemi; 83 L hemi; 37 bil hemi; avg 6y post injury(2mo-28y).	Rev of 478 pt files with videotaped gt analysis. Tested in bare feet & shoes at self-selected speed. Gt characteristics assessed through electronic mat & compared to previous data of age matched healthy subjects and subjects w/ stroke.	Gt speed, cadence, step time, SL on ea side, and time of stride period, stance period, & swing period.	TBI had gt vel < ½ norm; ↑ stride time; ↓ cadence; = stance time for affected LE; ↑ stance time for unaffected LE; ↑ DLS; ↓ SL compared to norm. TBI had ↑ gt vel, = stride time; = cadence; ↓ stance time compared to stroke. ↑ stance time & ↓ SL of unaffected LE w/ slower gt vel but unchanged w/ affected LE	TBI survivors produce gt pattern w/ prolonged stance period for unaffected LE w/o prolonged stance period for affected LE, & ↓ SL for affected limb. General gt characteristics following TBI can be applied to GT to improve rehab.	Slower gt vel in those <1 and @ 15y post injury. All subjects from same rehab facility No direct intervention applied Psychometrics and statistical significance not presented in article due to nature of study

Visintin et al. 1994 *Paraplegia* The effects of parallel bars, body weight support and speed on modulation of the locomotor pattern or spastic paretic gait.	What are the qualitatively and quantitatively effects of amb w/ & w/o //bars, w/ BWS, & at ↑ treadmill speeds on locomotor pattern of spastic paretic subjects? Cohort Study	n=8; avg 27.5yo; 7incom SCI to c-spine, 1 T-10 lesion; all indep amb w/ or w/o AD; 7mo-21y post injury	Each subjects amb in each of 3 walking conditions: 0%BWS, 40% BWS, and in // bars. Data collected at individuals predetermined, minimal, comfortable, and maximal gt vel.	Hip, knee, & ankle joint angles; EMG of gluteus maximus, vastus lateralis, medial hamstring, tibialis anterior, medial gastrocnemius, & lateral soleus of more involved LE. No functional OM.	In asymmetrically involved pts, amb w/o // bars= more symmetrical, ↓ compensation of less involved side, more normal swing phase muscle activity. In symm involved pts amb w/o // bars= ↑ EMG activity, prolonged activation of distal muscles in stance. 40% BWS= facilitation of gt in severely involved, ↓ clonus, ↑ gt speed	External factors and environment have effect on gt traits. Gt training in 0%BWS w/o // bars leads to more normal swing face, ↑ flexion of LE, ↓ compensation, ↓ asymm, ↓ clonus.	No control group for comparison Supports uses of BWS harness even without BWS in rehab over // bars
Williams et al. 2011 *J Head Trauma Rehab* Training conditions influence walking kinematics and self-selected walking speed in patients with neurological impairments	Which GT approach best promotes normal able-bodied walking in people w/ acquired brain injury (ABI)? Cohort Study	N=17; 10M,7F; avg 38.7yo (17-69yo); avg ht 175cm; avg wt=74.3kg; 11 severe TBI w/ PTA >28days; avg 91.6days PTA; 5 stroke; 1 MS; avg 9mo post injury; all req assist for amb	Each subject receiving GT in 7 conditions: 1) therapist facilitation 2) use of AD 3) TT w/o BWS 4) BWSTT 5) BWSTT+ therapist assist 6) BWSTT+ UE self support 7) BWSTT + UE self support + therapist assist All BWS set at 30%. Gt vel at individual comfortable speed. Measurement taken compared to healthy subjects.	Gait Performance Scale, gt vel via treadmill, kinematic movement of pelvis, hip, knee, ankle, and foot. Measurements taken during each of the 7 conditions using 3DGA	Sig difference between 4,6, & 7. ↑ abnormality of gt w/ BWSTT. ↓ gt vel w/ therapist assist or AD. 3 of 4 conditions w/ most normal walking pattern req UE assist 3x faster self selected gt speed in condition 7	If patients following BI use UE support during BWSTT, they will most likely amb 3x faster than that which can be obtained through therapist assist or w/ AD. BWSTT gt vel may not translate to OG amb vel	Supports use of UE support to achieve faster gt vel. May explain why so many systematic reviews are unable to find BWSTT more beneficial than COGT. Protocols focusing on ↑ gt vel & ↓ BWS may fail to consider impact of UE support for these individuals. Supports need to be studied in more homogenous pop

Wilson et al. 2006 *Am J Phys Med Rehabil* Ambulation training with and without partial weight bearing after traumatic brain injury	Does 8 wks of PWB GT improve functional amb to a greater extent than traditional therapy in individuals after TBI? RCT	n=40; 35M,5F, avg 29.6yo; subjects free of pscych illness, all subjects had LE posturing w/ ground contact	Both groups: PT 2x/day for 8 wks PWB: 1 hr PWB 2x/wk to replace normal GT rehab using Visintin protocol. Subjects allowed to use 2° BWS w/ UEs Traditional: individualized GT from PT for 1 hr/day for 5days/wk. Emphasis on neurofacilitation, isometric ex, assisted amb w/ goal of return to FWB, wt training, balance ex, stationary bike.	FIM & FAM measured at beginning & end of 8 wks Rivermead Mobility Index, Gross Motor Subscale, Standing Balance Scale, FAC collected weekly	Significant improvement over time for SBC, FAC, RMI, GMS, and FIM+FAM for both groups. No significant differences between groups pre- & post-difference scores.	Supports that PWB does not improve functional amb any more when compared to those who underwent traditional therapy. Both groups show significant improvement.	Supports that each tx method may be beneficial but one is not superior. Supports need for future research to determine if a certain pt profile or characteristics have better outcomes in PWB. Supports need for research with proper controls, stratification, and established precise OM.
Wilson et al. 2002 *Brain Inj.* Partial weight bearing gait retraining for persons following traumatic brain injury: preliminary report and proposed assessment scale	What are recovery patterns of walking ability in pts recovering from TBI receiving PWB GT? Could a new assessment scale of gt progress be beneficial for pts w/ TBI receiving PWBS GT? 2 Case Studies	Sub 1: 21yo white M w/ decerebrate posturing &GCS of 3 @ scene. GCS<6 for several wks Subj 2: 39yo white F TBI '82 & '92. Hx of falls, ↓ bal, uses WC, RW to amb	1hr PWB GT replaced 2-1hr session of pts PT/wk for 8 wk period. MAG Scale developed by authors from 4-stage progression of walking in children and used in conjunction with other measures to assess improvements in gt	Muscle tone & strength assessed weekly Modified Ashworth Scale, MMT, Standing Balance Scale, FAC, Missouri Assisted Gait Scale (MAG) measured prior to study, @ 2mo, @ 3 mo,& 6mo follow-up.	Both pts showed modest improvements in spasticity & strength. More functional gains in Subj 1 (acute) than subj 2 (chronic). Both improved 1 level in FAC. Improvements in both pts was most evident measured by MAG scale.	2 cases demonstrating improvements with PWBTT. MAG may be a more sensitive OM to assess improvements in gt with this population.	Exact tx/protocol not described. Support need for further psychometric research and utilization of MAG scale to assess efficacy in measuring improvement in TBI pop Supports BWSTT as tx method for early GT