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Comparison of treadmill training with partial body weight support to traditional over ground ambulation for gait training in acute and subacute patients post-stroke

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Comparison of treadmill training with partial body weight support to traditional over ground ambulation for gait training in acute and subacute patients post-stroke

Disciplines
Physical Therapy

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Title: Comparison of treadmill training with partial body weight support to traditional over ground ambulation for gait training in acute and subacute patients post-stroke.

Overall clinical bottom line: Overall, 2 of the 3 articles closely matched our clinical question, and one did not compare partial BWS over treadmill alone to overground ambulation. All 3 articles showed that both partial BWS over treadmill and overground ambulation without BWS are safe and effective gait training techniques for acute patients post-stroke. Although article 3 demonstrated a clinically important difference, the goal was to determine if an additional aerobic component made a difference in gait training, rather than if one technique was more effective than the other. It is not conclusive whether partial BWS treadmill training is more effective than over the ground gait training for walking speed and distance. Gait training with partial BWS over treadmill shows promise, but further studies with larger sample sizes and including a wider range of patients post-stroke need to be done for more conclusive results. The results of the articles did not show a clinical importance to warrant making any specific changes in gait training treatment. Therefore, the treatment technique can be determined by the available equipment and the clinician's discretion.

Clinical Scenario: At the inpatient rehabilitation unit I observed at, one form of body weight support system called the Lite Gait was used with certain patients post-stroke for gait training. Some therapists mainly did gait training by walking on ground without any body weight support, while other therapists preferred to use the Lite Gait over treadmill to provide partial body weight support during gait training. This led to the clinical question of whether partial body weight support over treadmill was more effective in improving gait than over ground ambulation without body weight support in patients post-stroke.

Clinical Question: Is partial body weight support over treadmill more effective than over ground ambulation without body weight support in improving gait in acute and subacute patients post-stroke?

Clinical PICO:
P: Patients aged 45-75 years within 6 months of their first stroke

I: Partial body-weight support over treadmill

C: Full body-weight over ground ambulation

O: 10 meter walk test (10mWT), 6 minute walk test (6MWT)

Search terms: Body weight, treadmill, gait, stroke

Appraised by: Hui En Gilpin, SPT
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September 22, 2009

Introduction: Gait training is an important aspect included in the physical therapy treatment for patients post-stroke. Apart from preparatory gait training, the traditional method was ambulation over ground using assistive devices and orthoses as needed, without any body weight support. With the advance in technology, several body weight support (BWS) systems have been developed to assist in gait training. The BWS system can be used in overground ambulation, treadmill training or with a mechanical gait stepper. Here, we are interested in comparing the effects of gait training in the acute and subacute population of patients post-stroke using the BWS over treadmill and overground ambulation with full body weight. The advantage of the BWS system is that patients can start gait training earlier in a safe environment, and with a treadmill, many repetitions of stepping can be accomplished. The disadvantages of the BWS over treadmill method are the high overhead cost initially, and the need for a second therapist, assistant or aide to operate it: one to guard the patient and assist with the paretic leg if needed, and another to help manage the BWS system and treadmill controls. The actual time for gait training may also be shorter with the BWS over treadmill technique because of a longer set up time. The objective here is to see whether research shows that gait training over treadmill is more effective than traditional overground ambulation to offset the costs of the treatment.

Article #1: Nilsson L, Carlsson J, Danielsson A, Fugl-Meyer A, Hellstrom K, Kristensen L, Sjolund B, Sunnerhagen KS, Grimby G (2001) Walking training of patients with hemiparesis at an early stage after stroke: a comparison of walking training on a treadmill with body weight support and walking training on the ground. *Clinical Rehabilitation* Vol. 15, Issue 5, pp 515-527.

Clinical bottom line: The study demonstrated that both partial BWS over treadmill and overground ambulation without BWS are safe and effective gait training techniques for acute patients post-stroke. Partial BWS over treadmill was no more effective than overground ambulation without BWS in improving walking speed. The primary concerns of internal validity were the lack of specific detail on the therapy techniques used in the control group, and a 10% study loss. These threats could have affected the outcome of the study. Based on this study, both treatments for gait training were shown to be effective, but further studies need to be done in order to determine if one technique is truly more effective than the other.

Article PICO:
P: Seventy-three Swedish men and women aged 70 years or less within 8 weeks of their first stroke with residual hemiparesis post stroke

I: Treadmill with body weight support (BWS) gait training, professional stroke rehabilitation

C: Motor Relearning Program (MRP) gait training on ground, professional stroke rehabilitation

O: Functional Independence Measure (FIM), Ten Meter Walk Test (10mWT), Functional Ambulation Classification (FAC), Fugl-Meyer Stroke Assessment, Berg Balance Scale (BBS)

Blinding: All assessors were blinded to group allocation of subjects. The subjects and therapists were obviously not blinded to group assignment.

Controls: There was no true control group (CG) but there was a comparison group that received gait training on ground without BWS that served as a CG.

Randomization: Subjects were randomized into 2 groups, 36 in the treatment group (TG) and 37 in the CG using sealed envelopes. At baseline, there were no significant differences between groups for sex, age, diagnoses, brain lesion location, NIH Stroke Scale, time in rehab department, and time post stroke at start of training.

Study: Seventy-three patients aged 70 years or less from the rehabilitation departments of Sahlgrenska University Hospital, Uppsala University Hospital and Lund University Hospital who were within 8 weeks of their first stroke with residual hemiparesis were included. Both groups received 30 minutes of walking training 5 days/week. The TG (n=36) consisted of walking with BWS (0-100% of user's weight) on a treadmill, with the physical therapist assisting with lifting the paretic leg as needed. The amount of BWS and speed on the treadmill was tailored to each patient according to their walking ability. The BWS was gradually reduced as fast as possible to attain walking on the treadmill with full weight bearing. The CG (n=37) received individual walking training over ground according to the MRP for stroke by Carr and Shepard by a physical therapist. Foot orthoses were used in both groups as needed. Both groups received an additional 30 minutes of physical therapy 5 days a week to improve motor control and to strengthen functionally weak muscles. The length of treatment for each patient ranged from 1 to 4 months.

Outcome measures: The outcome measures were taken at admission, and were repeated every month, at discharge, and at the 10 month follow up for a final assessment. The outcome measure that is relevant to the clinical question is the 10mWT. The authors did not discuss the minimal clinically important difference (MCID) for the 10mWT. An accepted MCID value for the elderly population post-stroke (60-80 years) is 0.10 m/s for the 10mWT.

Study losses: Five subjects did not complete the study for medical reasons, 2 passed away and 2 refused to walk on the treadmill. One subject randomized to the control group insisted on walking on the treadmill, resulting in 66 subjects at discharge (TG: n=32, CG: n=34). Another 2 subjects moved, and 1 subject decided not to participate in the study at the 10 month follow up. This resulted in a total loss of 13 patients out of 73, leaving 60 patients (28 in the TG and 32 in the CG) at the 10 month follow up.

Summary of internal validity: Randomization of the study subjects, similarity of subjects at baseline, blinding of assessors to randomization, similarities in treatment time and rehab therapy besides gait training suggest high internal validity for this study. The primary threats to internal validity include the lack of detail on the CG treatment, the lack of blinding of therapists and patients, and study losses. The lack of detail on the CG treatment is a minor threat because it makes it more difficult to reproduce the study. There was no blinding of therapists or patients mentioned in the article. This is a minor threat because if the subjects were led by the therapists to believe that the treadmill training with BWS was better, it could have had an effect on the outcome. There was a study loss of 7 out of 73 patients at discharge. This is a moderate threat, because of the 10% fall out rate (4 from TG, 3 from CG). Overall, there are no major threats to the internal validity.

Evidence: The article reported no statistically significant differences between groups at discharge for FIM, Fugl-Meyer Stroke Assessment, FAC, walking speed and BBS. All the outcome measures between groups were analyzed using Fisher's nonparametric permutation test for statistical significance. The outcome measure we are interested in is the improvement in walking speed as measured by the 10mWT from baseline to discharge. Table 1 summarizes the data from the article, and the numbers are used to calculate the mean difference and effect size between groups in table 2.

Table 1: Walking speed (10mWT)

	Baseline	Baseline to discharge
TG (Treadmill, n=32)	0.4±0.2 m/s	0.4±0.3 m/s
CG (Overground, n=34)	0.4±0.2 m/s	0.3±0.3 m/s

Table 2: Mean difference and effect size with 95% confidence interval (CI) of improvement from baseline to discharge between groups calculated based on data from article

	Walking speed (m/s)
Mean difference	0.1 (-0.06 to 0.26)
Effect size	0.33 (-0.15 to 0.82)

The mean difference between groups is 0.1 m/s, which is equal to the MCID and suggests that there could be a clinically important difference between groups. However, the 95% CI is wide and goes negative, which means that the results could have been reversed. The effect size between groups is 0.33, which is medium (> 0.2, < 0.8), but the 95% CI is fairly large and even goes negative, which means that the CG could have been better than the TG. Thus the results are inconclusive as to whether the TG is more effective than the CG in improving walking velocity.

Applicability of study results:

Similarity to my patients: The subjects in this study are similar to the clinical population in that they were first time patients within 8 weeks post-stroke, and the age range is close to the clinical population, but does not include any subacute patients within 6 months post-stroke. The age range includes patients slightly younger than the clinical PICO so results may vary with the older population. This study excludes those with other severe disabilities, which may not be representative of the whole clinical population of interest.

Benefits/cost: The financial cost of treatment is similar in both groups with five 1 hour therapy sessions per week for 1 to 4 months for both groups. However, one treatment did not appear to be more effective than the other, so using either approach would be comparable if the facility already has a system for providing BWS. The benefit of BWS is that walking can be initiated sooner in patients who may not be able to otherwise walk, and it is also a safe environment to initiate walking. However, the equipment required has a large overhead cost and it may require a second person for a therapy session with BWS over treadmill training to assist the patient and manage the equipment.

Feasibility of treatment: The specific treatments for the CG and the TG minus the gait training are realistic and feasible treatments provided in any rehabilitation facility. The gait training used for the CG is easily provided in any facility, but the treadmill walking with BWS requires equipment that not every facility may have. The amount of therapy provided in these treatments are also within reason and feasible to be covered by insurance.

Summary of external validity: The subject sample is similar to those patients one would encounter at a stroke rehabilitation facility. The study subjects included subjects from 3 different rehabilitation facilities making it easier to extrapolate the results of this study to a more generalized population of patients with stroke. However, this study only included acute subjects within 8 weeks post-stroke. Because of this the results may not be able to be generalized to all acute and subacute patients post-stroke.

Article #2: da Cunha IT, Lim PA, Qureshy H, Henson H, Monga T, Protas EJ (2002) Gait outcomes after acute stroke rehabilitation with supported treadmill ambulation training: a randomized controlled pilot study. *Archives of Physical Medicine and Rehabilitation* Vol. 83, Issue 9, pp 1258-1265.

Clinical bottom line: The study demonstrated that both partial BWS over treadmill and overground ambulation without BWS are safe and effective gait training techniques for acute patients post-stroke. Partial BWS over treadmill was no more effective than overground ambulation without BWS in improving walking speed and distance. The primary concerns of internal validity were the lack of specific detail on each component of therapy, and a small sample size with 13% study loss. These threats could have affected the outcome of the study. Based on this study, both treatments for gait training were shown to be effective, but further studies with a larger sample size to generate a higher power and more detailed procedures need to be done in order to determine if one technique is truly more effective than the other.

Article PICO:
P: Fifteen subjects with recent unilateral stroke (< 6 weeks) resulting in hemiparesis with significant gait deficit

I: Regular rehabilitation with supported treadmill ambulation training (STAT) substituted for overground gait training

C: Regular rehabilitation comprising of physical therapy including overground gait training, kinesiotherapy and occupational therapy

O: Walking velocity for 5 meters (5mWT), FAC, walking distance covered in 5 minutes (5minWT), gait energy expenditure, gait energy cost

Blinding: There was no mention of blinding of assessors, therapists or subjects, so we assume it was not done.

Controls: There was no true control group (CG), but the group without STAT served as the CG. Both treatment group (TG) and CG received regular rehabilitation otherwise on non-gait activities.

Randomization: Subjects were randomized into regular rehabilitation group (CG) and regular rehabilitation with STAT group (TG) by using random numbers to preassign them based on recruitment order. There were no significant differences at baseline between the two groups for cognition, demographics, impairments, or number of days poststroke.

Study: Fifteen patients post-stroke were conveniently sampled from the Rehabilitation Medicine Service at the Veterans Affairs (VA) Medical Center in Houston, TX. Inclusion criteria include unilateral stroke less than 6 weeks poststroke with hemiparesis, significant gait deficit measured by a gait speed of 0.6 m/s or less, a score of 2 or less on the FAC and sufficient cognition to participate in the training. Exclusion criteria include history of bilateral stroke, comorbidities or disabilities other than stroke that preclude gait training, myocardial infarction within the past 4 weeks or cardiac bypass surgery with complications, any uncontrolled health condition for which exercise is contraindicated, presence of significant lower extremity degenerative joint disease that would interfere with gait training, or body weight over 110 kg for purposes of fitting the harness. The 15 subjects were randomized into 2 groups, 7 in the TG with regular rehabilitation and STAT, and 8 in the CG with just regular rehabilitation. Regular rehabilitation included 1 hour each of physical therapy for strengthening, function and mobility activities including gait training, kinesiotherapy for strength and endurance, and occupational therapy for activities of daily living (3 hours total). In the TG, STAT was substituted for overground gait training, and only stairs, locomotion on uneven surfaces and training on walking devices were allowed during the regular physical therapy portion. With STAT, a BWS system was used with 30% of BWS over treadmill. The amount of BWS was progressively decreased to zero based on the therapist's observation, and the treadmill speed progressively increased by increments of 0.01 m/s. The STAT portion of therapy consisted of 20 minutes/day. Every subject was treated 5 times/week until discharge, for an average of 3 weeks.

Outcome measures: The outcome measures were measured at baseline and discharge. The outcome measures that are most relevant to our clinical question are walking velocity (5mWT) and walking distance (5minWT). The authors stated that the reliability of gait speed in persons with gait impairments is excellent. The authors also stated that the 5minWT had excellent validity and reliability. The study used 5 minutes instead of 6 minutes (6MWT) because of anticipated serious initial gait compromise in patients. The authors did not mention the MCID value for the walking velocity, but an accepted MCID value for walking velocity is 0.10 m/s and an accepted MCID for the 5minWT is 42 meters (interpolated from an MCID of 50 meters for a 6MWT).

Study losses: There was a loss of 2 subjects, one from the TG because he did not complete at least 9 STAT sessions, and the other from the CG because of pulmonary complications. These 2 subjects were not included in the analysis

Summary of internal validity: Randomization of the study subjects, similarities in treatment time and rehab therapy besides gait training suggest high internal validity for this study. The study mentioned that subjects were not similar at baseline for pre-test scores, but this was compensated for with statistical analysis using the ANCOVA. The primary threats to internal validity include the lack of specific details on each component of therapy, small sample size, a 13% study loss, the lack of blinding of assessors, therapists or subjects and not reporting the values of reliability and validity of outcome measures used. The lack of detail on each component of therapy is a moderate threat because it would be difficult to reproduce the results of the study. Also, kinesiotherapists are usually only found in VA hospitals, and are traditionally the ones who provide gait training. The specifics of the kinesiotherapy treatment was unclear. The study loss is a moderate threat because of such a small sample size. A power analysis was also not done to determine what sample size was needed. The lack of blinding of the assessors is a minor threat because the outcome measures are objective, and so the effect on the outcome should be minimal. The lack of blinding of therapists and subjects is a minor threat as therapists could have influenced the subjects as to which intervention was better. Although the study mentioned that the outcome measures had high validity and reliability, the actual values were not given, which is a minor threat. Overall, there are no major threats to the internal validity.

Evidence: The article reported no statistically significant results with any of the outcome measures analyzed. The outcome measures included walking velocity and distance, gait energy expenditure and gait energy cost. Statistical analysis was completed with appropriate parametric statistics when appropriate and the particular test for significance was the ANCOVA. The outcome measures we are interested in are the walking speed (5mWT) and walking distance (5minWT). Tables 3 and 4 summarize the data from the article, and the numbers are used to calculate the mean differences and effect sizes in table 5.

Table 3: Walking speed (5mWT)

	Baseline	At discharge	Baseline to discharge
TG (Treadmill, n=6)	0.36±0.25 m/s	0.59±0.29 m/s	0.23±0.12 m/s
CG (Overground, n=7)	0.12±0.15 m/s	0.27±0.23 m/s	0.15±0.14 m/s

Table 4: Walking distance (5minWT)

	Baseline	At discharge	Baseline to discharge
TG (n=6)	81.6±60.17 m	170.83±85.87 m	89.17±54.40 m
CG (n=7)	17.73±18.78 m	60.71±54.37 m	42.99±48.60 m

Table 5: Mean differences and effect sizes (with 95% CI) of improvement from baseline to discharge between groups calculated based on data from article

	Walking speed (m/s)	Walking distance (m)
Mean difference	0.08 (-0.07 to 0.23)	46.18 (-14.21 to 106.57)
Effect size	0.62 (-0.50 to 1.73)	0.90 (-0.24 to 2.04)

The mean difference for improvement in walking speed is 0.08 m/s, which is not clinically important (< MCID=0.10 m/s). The effect size for improvement in walking speed is medium (> 0.2, < 0.8). The mean difference for the improvement in the 5minWT is 46.18 m, which is clinically important (> MCID=42 m). The effect size for improvements in 5minWT is large (> 0.8) between groups. The 95% CI for the mean differences and effect sizes for both tests are wide and go negative. This means that if repeated enough times, the results could be flipped, with the CG showing more improvement than the TG for the 5mWT and 5minWT. Therefore, the results are inconclusive as to whether STAT training is more effective than traditional gait training.

Applicability of study results:
Similarity to my patients: The subjects in this study are similar to the clinical population in that they were first time patients within 6 weeks post-stroke, and the age range (44-75 years). The article does not represent the subacute patients within 6 months post-stroke that we were also interested in. Only patients with a significant gait deficit (gait speed of 0.6 m/s or less and FAC score of 0, 1 or 2) were included in the study, which is a narrower scope of patients than the clinical population of interest.

Benefits/cost: The time and financial cost of treatment is similar in both groups with 3 hours daily of therapy sessions 5 times a week until discharge. However, the equipment required for the BWS over a treadmill has a large overhead cost. Set up time could possibly reduce actual treatment time for the gait training of the TG.

Feasibility of treatment: The treatment used for both groups minus gait training for the TG is easily provided in any rehabilitation facility. The TG gait training requires equipment that not every facility may have. The amount of therapy provided in these treatments are also within reason for an inpatient rehabilitation program and feasible to be covered by insurance.

Summary of external validity: The subject sample is similar to those patients one would encounter at a stroke rehabilitation facility. It is hard to extrapolate the results to a more general population of patients with stroke because all the subjects were taken from a single VA medical center, only included those with significant gait deficits and had a small sample size. The total therapy time for both groups was not significantly different.

Article #3: Eich HJ, Mach H, Werner C, Hesse S (2004) Aerobic treadmill plus Bobath walking training improves walking in subacute stroke: a randomized controlled trial. *Clinical Rehabilitation* Vol. 18, pp 640-651.

Clinical bottom line: The study demonstrated that partial BWS over treadmill in addition to overground ambulation is potentially more effective than overground ambulation alone in improving walking speed and distance. The primary concern of internal validity was the lack of detail in part of the treatment components. This threat could have affected the outcome of the study. Although this study showed that partial BWS over treadmill plus overground ambulation was slightly more effective than overground ambulation alone, further studies need to be done in order to determine if one technique is truly more effective than the other.

Article PICO:

P: Fifty patients aged 50 – 75 years within 6 weeks post supratentorial stroke requiring intermittent help or stand-by assist during walking

I: Treadmill training with partial BWS and Bobath oriented physiotherapy

C: Bobath oriented physiotherapy

O: Ten meter walk test (10mWT), 6 minute walk test (6MWT), Rivermead Motor Assessment Score (RMA) for gross functions, walking quality adapted from Los Ranchos Los Amigos Gait Analysis handbook

Blinding: It is obviously not possible to blind patients or therapists to the group allocation. The 2 assessors for the RMA were not involved in the therapy, and were supposed to be blind to group allocation, but the authors mentioned that disclosure by patients and teammates could not be fully excluded. The single assessor for the walking quality was blind to group allocation and home on maternity leave, where she rated each patient based on videos. There was no blinding of assessors mentioned for the 10mWT and 6MWT.

Controls: There was no true control group (CG), but the group without treadmill training with BWS served as the CG. Both treatment group (TG) and CG received regular individual Bobath oriented physiotherapy.

Randomization: Subjects were randomized into TG and CG by an independent person who chose one of 50 total sealed envelopes 30 minutes before the start of intervention for each of the 50 patients, thus randomly assigning 25 each to the TG and CG. At baseline, the two groups were found to be satisfactory for diagnosis, affected side, time of onset, age, sex, height, weight, and Barthel index.

Study: Fifty hemiparetic patients within 6 weeks of their first supratentorial stroke aged 50 to 75 years from one inpatient rehabilitation center were included in the study. Inclusion criteria include being able to walk at least 12m with intermittent help or stand-by assist, cardiovascular stable, absence of other neurologic or orthopaedic disease impairing walking, and ability to understand the purpose and content of the study. All subjects received 1 hour of individual therapy time 5 days a week for 6 weeks. The 25 subjects in the TG received treadmill training with partial BWS up to 15% for 30 minutes and other individual physiotherapy for 30 minutes. The CG (n=25) received individual physiotherapy for the full 60 minutes. The treadmill training consisted of graded treadmill walking at a defined training heart rate. The 30 minutes included 1-2 minutes of warm up and cool down periods on the treadmill, and patients could have 2 optional short pauses for rest. The individual physiotherapy for both groups was Bobath oriented, exclusively concentrated on walking rehabilitation, including tone inhibiting and gait preparatory movements, walking on the floor and stairs. Subjects were fitted with necessary orthoses and walking aids at the beginning of the study. Occupational therapy and speech therapy were also administered to subjects according to individual needs.

Outcome measures: Assessments were done at baseline, at discharge (6 weeks), and at the 12 week follow-up. The outcome measures that are most relevant to our clinical question are the 10mWT and 6MWT. The authors did not mention the MCID value for any of the outcome measures, but an accepted MCID value for the 10mWT is 0.10 m/s and an accepted MCID for the 6MWT is 50 meters.

Study losses: There were no study losses at the end of the 6 week treatment, but there was one study loss at the 12 week follow-up from the TG based on refusal to attend the follow-up assessment.

Summary of internal validity: Randomization of the study subjects, similarity of subjects at baseline, similarities in treatment time and rehab therapy besides gait training, and no study losses at time of discharge suggest high internal validity for this study. The primary threats included the lack of detail on certain components of therapy, the lack of blinding of assessors on 10mWT and 6MWT, therapists and patients. The partial BWS over treadmill portion of gait training was explained in detail, but the Bobath oriented portion of therapy was vague. The lack of detail on components of therapy provided is a minor threat because it makes the results of the study difficult to reproduce. The lack of blinding of the assessors is a minor threat because the outcome measures are objective, and so the effect on the outcome should be minimal. The lack of blinding of therapists and subjects is a minor threat as therapists could have influenced the subjects as to which intervention was better. There was a study loss of 1 out of 50 patients at the 12 week follow-up, but was not a threat to internal validity because it was not relevant to our clinical question. Overall, there are no major threats to internal validity.

Evidence: The article reported a statistically significant improvement between groups for walking speed and distance. The article did not state that there were any statistically significant differences between groups for the RMA and walking quality scale. Statistical analysis for the walking speed and distance was completed using the two-way ANOVA. The Mann-Whitney U-test was used for statistical analysis of the RMA and walking quality scale. The outcome measures we are interested in are the walking speed (10mWT) and walking distance (6MWT) at discharge (6 weeks). Tables 6 and 7 summarize the data from the article, and the numbers are used to calculate the mean differences and effect sizes in table 8.

Table 6: Walking speed (10mWT)

	Baseline	Discharge	Baseline to discharge
TG (Treadmill, n=25)	0.40±0.17 m/s	0.71±0.30 m/s	0.31±0.17 m/s
CG (Overground, n=25)	0.44±0.22 m/s	0.60±0.22 m/s	0.16±0.13 m/s

Table 7: Walking distance (6MWT)

	Baseline	Discharge	Baseline to discharge
TG (n=25)	108.1±50.8 m	198.8±81.1 m	90.6±43.5 m
CG (n=25)	108.9±60.1 m	164.4±69.3 m	55.7±32.6 m

Table 8: Mean differences and effect sizes (with 95% CI) of improvement from baseline to discharge between groups calculated based on data from article

	Walking speed (m/s)	Walking distance (m)
Mean difference	0.15 (0.06 to 0.24)	34.9 (12.18 to 57.62)
Effect size	0.99 (0.40 to 1.58)	0.92 (0.34 to 1.50)

The mean difference for improvement in walking speed is 0.15 m/s, which is greater than the MCID and suggests a clinically important difference between groups. However, the 95% CI goes as low as 0.06 which means that there may not always be a clinically important difference between groups for walking speed. The mean difference for improvement in the 6MWT is 34.9 m, which is not clinically important (< MCID=50 m). The effect sizes for walking speed and walking distance are large (> 0.8) to medium (> 0.2, < 0.8) when the 95% CI is taken into account.

Applicability of study results:

Similarity to my patients: The age range (50-75 years old) and most of the inclusion criteria of the subjects participating in this study were an acceptable fit for representing the clinical picture of acute patients post-stroke. This article did not represent the sub-acute patients within 6 months post-stroke we were also interested in. The study also only includes those who were able to walk a minimum distance of 12 meters with intermittent help or stand-by assist, which may not be representative of the whole spectrum of patients with stroke at different levels on impairments in the clinical population of interest.

Benefits/cost: Each subject received the same amount of therapy time, therefore financially each subject was being charged the same amount for their treatments. Clinically, not all facilities will have a BWS treadmill available, so the initial cost of the equipment would be more.

Feasibility of treatment: The specific treatments for the CG and TG minus the gait training are realistic and feasible treatments provided in any rehabilitation facility. If the facility had the proper equipment for BWS treadmill training, then that gait training portion of the TG treatment would also be realistic, but not every facility will have the necessary equipment. The amount of therapy provided in these treatments are also within reason for an inpatient rehabilitation program and feasible to be covered by insurance.

Summary of external validity: The subject sample is similar to those patients one would encounter at a stroke rehabilitation facility. It is hard to extrapolate the results to a more general population of patients with stroke because all the subjects were taken from a single center of patients with stroke in inpatient rehabilitation and only included moderately affected acute patients with stroke. The total therapy time for both groups was not significantly different.

Synthesis/Discussion: The subject populations in all 3 articles were similar in age, and from the acute population within 6-8 weeks of their first stroke. The length of treatment in all 3 articles until discharge ranged from 1 to 4 months, and included 1 hour of physical therapy 5 times/week, with gait training comprising of 30 minutes in articles 1 and 3 and 20 minutes in article 2.

Articles 1 and 2 showed that the mean differences for improvement in walking speed were equal and less than the MCID respectively, and the effect sizes were medium. The 95% CI for both calculations were wide and went negative. The mean difference for improvement in walking speed in article 3 was greater than the MCID, but could be below the MCID if the 95% CI was taken into account. The effect size for walking speed in article 3 was greater than the first two articles, showing a large to medium effect, even with the 95% CI taken into account. Article 1 did not have walking distance (6MWT) as an outcome measure. The mean difference for improvement in walking distance for article 2 was greater than the MCID, but had a wide 95% CI that went negative, and that for article 3 was not greater than the MCID. The effect sizes for improvement in walking distance for both articles 2 and 3 were larger, but had wide 95% CI, going negative in article 2, and to a medium effect in article 3. These results are summarized in table 9 below.

Table 9: Summary of mean differences and effect sizes of improvement from baseline to discharge between groups with 95% CI for all 3 articles

	Article 1 (10mWT)	Article 2 (5mWT, 5minWT)	Article 3 (10mWT, 6MWT)
Mean difference for walking speed (m/s)	0.1 (-0.06 to 0.26)	0.08 (-0.07 to 0.23)	0.15 (0.06 to 0.24)
Effect size for walking speed	0.33 (-0.15 to 0.82)	0.62 (-0.50 to 1.73)	0.99 (0.40 to 1.58)
Mean difference for walking distance (m)	N/A	46.18 (-14.21 to 106.57)	34.9 (12.18 to 57.62)
Effect size for walking distance	N/A	0.90 (-0.24 to 2.04)	0.92 (0.34 to 1.50)

The results from all 3 articles are inconclusive as to whether BWS treadmill training is clinically more effective than overground gait training in acute populations of patients within 6-8 weeks post-stroke for improvement in walking speed and distance from baseline to discharge. No conclusions can be made for the subacute population of patients within 6 months post-stroke in the clinical population since that group was not included in any of the 3 article populations.

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