

**A critical appraisal of “A Pilot Study of Randomized Clinical  
Controlled Trial of Gait Training in Subacute Stroke Patients with  
Partial Body-Weight Support Electromechanical Gait Trainer and  
Functional Electrical Stimulation”**

**By**

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## **Abstract**

**Critical appraisal is an effective skill for clinical practitioners to exercise when providing services to a patient. I practiced the skill of critical appraising by using a data base to search for an experimental article relating to my clinical question. My clinical question is comparing electromechanical gait training to traditional gait training for acute stroke patients. I limited my search to interventions with electromechanical-assistance and found four quality research experiments. I chose an article from a hospital in Hong Kong that compares gait training, electromechanical gait training and electromechanical gait training with functional electrical stimulation. I chose the article because of the quantity of information over the reliability and validity of the experiment. In my opinion, the article is controversial over if it would provide credible information to health care providers. I critiqued the introduction, methods, results and discussion by looking at limitations, areas where results could be skewed and the overall quality of the paper. The article provided a detailed description of the methods and stayed in line with the purpose of the experiment. I believe the article's conclusion is clinically significant to physical therapy practice by the large margin of measurable outcomes for the electrotechnical gait training with functional electrical stimulation. In the future, I would encourage to critique multiple article before using data in the clinic.**

## **Key words**

**Appraisal, critical, article, gait, training**

## **Introduction**

Healthcare providers are responsible to stay up to date with the latest scientific research. By accurately deciphering through research articles on accredited websites, physical therapists can efficiently use valid and reliable information to help their patients and communities. My clinical question is comparing the intervention of electromechanical-assisted treadmill training to regular treadmill training when improving gait patterns in acute stroke patients.

## **Methods**

The database used was the US National Library of Medicine: PubMed. The keywords I typed in to find my research were acute, stroke, electromechanical, treadmill, ambulation and intervention. In my search, I included all ages and cultures. I excluded any interventions that did not include electromechanical-assisted interventions. I excluded populations of chronic or non-acute stroke patients. I believe there is a difference in how physical therapists use interventions to treat chronic versus acute stroke patients. To keep the data consistent, only acute patients were included in the study. I found four quality experiment-based articles from which to choose. There were a few systematic reviews over electromechanical assisted gait interventions, but my goal was to find experimental based articles only.

The source of the journal is the American Heart Association. The authors of the article are Maple F.W. Ng, Raymond K.Y. Tong and Leonard S.W. Li. The article as published in Hong Kong, China in 2007. I chose this article for a comprehensive critical appraisal because of the amount of information on the reliability of the experiment.

## **Results**

### Summary of the study

The article starts by stating the significance of early intervention of gait-focused locomotion training for acute stroke patients. The purpose of this article is to compare the success of three different gait-training techniques on acute stroke patients and the long-term effects of the interventions. The study design was a randomized controlled trial that lasted for four weeks with a six-month follow up. First time stroke patients in a hospital in Hong Kong were chosen and placed from a random number generator into three different intervention groups. Group 1 is the conventional gait training intervention (CT), Group 2 is the electromechanical gait trainer (GT), and Group 3 is the electromechanical gait trainer with the functional electrical stimulation (GT-FES). Each participant would undergo 20 minutes of gait training each weekday for four weeks and their physical therapists were blinded to the group assignments. One physical therapist did the outcome measures before and after the interventions, and also six months later for all the participants. Neither the participants nor the therapists were blinded to the treatments. The results concluded that participants in the GT and GT\_FES interventions had better improvements in walking speed, gait mobility and ambulation independence. In conclusion, the subjects from all three groups were able to continue their intervention practice long-term, which is shown in the six-month follow up screening.

### Appraisal of the study introduction

The introduction is comprehensive and provides information about the importance of focusing on gait training in stroke patients. I appreciate how the introduction explains the evolution of gait

training therapy from traditional to the addition of functional electrical stimulation (FES) to strengthen the intervention. When formulating the rationale of the study, the author used literature which provides integrity.

The author did not provide literature explaining the safety and usage of electro-mechanical training. A majority of the literature journals are not within the past 10 years. Therefore, the journals are not credible journals because they are not up to date with the latest technology studies.

#### Appraisal of the study methods

The study was a randomized controlled study. The same physical therapist recorded the results at the end of the intervention. The demographics of the type of stroke patients had resulted in no significant difference between each group. The assessments Berg Balance Scale (BBS) and Barthel Index (BI) have excellent reliabilities for geriatric patients. There were seven screen tests done for each patient and two out of seven have high reliability. The screen tests can be easily replicated in the future because each test is well-known and described in detail in the article. The ANOVA, Kruskal Wallis Test was the statistical analysis used appropriately.

The participant pool was small, leading to less accurate results. For the different interventions, the person screening the subjects and the clinicians were not blinded to the group assignments. Also, the article does not have information on the sociodemographic of the participants. Further, the interventions could have been described in greater detail. Since each participant had their own therapist for the interventions, the interventions were not followed by a strict step by step process. I do not think the performance could be replicated if there was a lot of variability in the trainings. The subjects having different therapists creates a limitation on the reliability of the

experiment. A limitation of the screening can be that the tests are geared towards geriatric patients. In the future, an experimenter screening of younger patients could have different results that are not necessarily comparable.

### Appraisal of the study results

The results were organized with tables. The timeline of the procedures, for example the baseline experiment to the six-month follow up, were presented orderly in both the methods and the results. The results clearly addressed the research question. The hypothesis was addressed throughout the results and the data shown is clear and valid to what the hypothesis is testing. The statistically significant results are the EMS, FAC and Gait Speed tests. Each test had a P value lower than 0.05. I think each test is considered clinically meaningful. The EMS and FAC increased at relatively significant amounts for the clinic. Both tests are appropriate for stroke rehab. Also, the gait speed test increased velocity at a clinically significant amount.

The authors did not clearly report all the outcome measures presented in the methods. There were a lot of tests mentioned in the methods, but they were not specifically addressed with the outcome measures. The results were more general by comparing the measurement of improvement in gait performance. There were not specific numerical numbers listed in specific tests. Figure 2 did not clearly state the reasons for subjects leaving the experiment. By observing the table, we can see that subjects decreased with no explanation of why this occurred. The figure also did not clarify what “intention to treat means.” In Table 2, the last column called “Post hoc (P) is unclear. There is not enough explanation at the bottom of the table to clear up confusion.

### Appraisal of the study discussion

The authors tied the findings from the study to existing literature. The conclusions are reflective of the results. The authors clearly explained the clinical meaningfulness of the results in the discussion. Future studies are suggested with a larger group of participants and a blinded study. The results and conclusion show clinical significance for a four-week intervention using the electromechanical gait trainer to increase locomotion recovery. This helps to maintain an ambulatory ability up to the six-month follow up experiment.

In the discussion, the authors did not elaborate on the meaning of findings, but instead repeated what was expressed in the results. The studies were from 13+ years ago, so their findings could possibly be out of date. Also, specific literature did not mention electromechanical gait trainer or functional electrical stimulation. The author suggests a greater number of participants in the blinded randomized control trial for future studies. Another potential limitation is the lack of functional electrical stimulation to healthcare workers.

### **Discussion**

This article is significant to physical therapists by presenting an early intervention of electromechanical gait training and functional electrical stimulation. The article's results compare traditional gait training to electromechanical treadmill training. Then, the article goes a step further to discuss the effects of electrical stimulation devices although this can be labeled as extra information not necessary to help answer my question. The article also adds a six-month follow up that can strengthen the reliability of the findings like electromechanical assistance has better results long-term than traditional training.

The intervention of electromechanical gait training with a functional electrical stimulation is proven by the article's experiment to improve gait performance for people with an acute stroke. I believe the intervention can be more beneficial than traditional gait training. The potential risk is the lack of accessibility to electromechanical gait trainers with functional electrical stimulations. Hospitals and clinics do not have access to attain this specialized type of intervention. Since the only risk is the cost, I believe the potential benefits outweigh the potential risks. The results in comparison are clinically significant and are worth the investment in equipment. Lowering the expenses of equipment and allowing more accessibility to the technology to more clinics can help improve the argument for promoting the intervention.

When confidently informing an opinion of an intervention plan for a patient, having multiple articles proving clinical significance for an intervention provides sufficient evidence and validity. The article provides enough validity on its own to allow a therapist to confidently suggest that the intervention might improve results. The other literature mentioned in the article to back up its argument are over 10 years old and would be categorized as outdated. I would do more research to see if another experiment article provides similar results or see if the experiment has been repeated recently since the number of participants are low. The intervention has a lot of technological components to the equipment and must require training on how to use and interpret the data from the interventions.

In conclusion, the article provides some clinical meaningfulness that can provide beneficial results to acute stroke patients. In the future, I would encourage critical appraisals of multiple articles to provide more credibility to know if the intervention is efficient to patients.