Effect of Constraint-Induced Movement Therapy on Upper Extremity Function 3 to 9 months After Stroke: The Excite Randomized clinical Trial

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1.) The research question has a good deal of merit. The research question doesn't explicitly state, but could be understand to be, after evaluating the impact over the span of 12 months comparing the 2-week multisite program of CIMT vs. usual and customary care, is there greater improvement in upper extremity function among patients who had a first stroke within the previous 3 to 9 months? The research question might not be as pressing as some other studies, but it is worth researching to figure out if CIMT, constraint-induced therapy, would help improve upper extremity function. The research question is novel because they haven't ever done this with multiple sites and it hasn't been repeated in this large of a sample. The research question is reasonable because there are similar studies that have been replicated which tells us that it can be done in a reasonable manner. The research study is ethical and the research question is interesting to find out if CIMT really helps improve upper extremity function. Overall, the research question is suitable and the researchers seem well intentioned in figuring out an effective method of gaining upper extremity mobility.

2.) The research question is clearly stated by indicating that they are comparing one group with another group while one of the groups receives different treatment. The experimental group receives CIMT and the control group receives usual care. There is also a clear time frame, 12 months, in which they decided they'd

to stop the experiment, but for the experimental group they will constrain the hand for the first 2 weeks. The research question is clear to articulate that the group who receives the CIMT will improve greatly in upper extremity function compared to the group who receives usual care. The introduction adequately sets the background for the reader because the author talks about the impact on people in the United States being affected by strokes. The author elaborates on the impacts of stroke on a broader scale, the article talks about the researchers reason to set up the research study and sets the stage for the research question to be presented. The introduction does a good job of stating why they are proceeding with a study like this, because when using the traditional rehabilitation approach or usual care approach it revealed it didn't prove the desired effect with stroke patients who have limited upper extremity function. They are taking a more non-traditional approach for this study instead after helping us to understand the reason why it is necessary to further this research. The authors of this article are concise. Given the research question and background of the hypotheses it is appropriate and clearly stated with knowing that they are both congruent with procedures and actions that will be taken in this study.

3.) The execution of the research design is appropriate for this study. In this article, the researchers used a true experimental design; more specifically, included a pre-test and a post-test. The control group and the intervention group were the two groups that were randomly assigned before the baseline tests were measured. In the intervention group they received extremity constraint induced therapy

treatment for two weeks. The participants were picked from 247 facilities, screened for exclusion, and then randomly assigned to the experimental control condition using an automated centralized system. There needs to be a definite starting and stopping point in the research design in order to realize there is an improvement between the two groups. The researchers provided a suitable research design to test the hypothesis and answer the research question because of the timely manner in which they executed the research study. Another strength that improved the research design was they used a quantitative way of measuring improvements to clearly present a change. They randomly assigned the groups explained by the authors, " This adaptive randomization scheme maximized the chances of an even distribution of 4 characteristics (sex, prestrike, dominant side, side of stroke, and level of paretic arm function) across the study conditions" (Wolf ,2006, p. 2097), and the researcher were avoiding bias. This random assignment decreased bias in the study. Also, in the study they used a mixed method approach by including qualitative and quantitative measurements. The qualitative analysis they incorporated were journals they used to record the MAL gains in daily living activities by the participants and the caregivers. The quantitative measurements used were the WMFT measurements they measured for time and strength tasks. The clear timing allows the reader to observe a change, bias was reduced from random assignment, and mixed method approach was suitable for a true-experimental research design for the study.

The strengths of the research design were they were able to randomize the participants after screening them. One of the weaknesses of the research design was not making sure that there were enough participants in the lower functioning CIMT. There were other variables that needed to be excluded and the research design didn't prevent exclusion and that was not getting enough information on the use of medications and more about the location of each anatomical stroke. Recruiting more people and monitoring the participants could minimize the weakness and making sure the lower functioning group would have less of a discrepancy than the higher functioning group within the CMIT group.

I think there wasn't group equivalence and the researchers used randomizing from a computer that did help with equivalence, but they needed to use matching for more equal groups. They needed to take into account smaller number lower-functioning individuals enrolled results in lower number improvements than higher functioning participants in the CMIT group.

Attrition did occur with 23 participants dying assigned to constraint-induced movement therapy and 29 participants dying assigned to the usual care control group. The potential for sample bias was the results are going to be different from the initial sample and will impact the nature of the group itself. They could have made the study shorter to prevent attrition.

5.) The choice of data collection procedures was to compare the control group and the experimental group for improvement of upper extremity function and they

successfully picked suitable data collection procedures. They collected data by project staff every month and during scheduled testing for the CIMT group and the usual care group. The usual care received these kinds of care as explained, "Usual and customary care ranged form no treatment to the application of mechanical interventions (orthotics) or various occupational and physical therapy approaches in the home, day treatment program, outpatient hospital visits" (Wolf et al., 2006, p. 2097). On the other hand, the experimental participants had a different protocol to follow for the first 2 weeks, "Participants in the intervention group are wearing mitts on the non- affected arm and for a 2-week period including weekends equaling a total of 14 days. They want these participants to wear these mitts 90% of the time they are awake. They receive task training of the affected extremity for 6 hours per day" (Wolf et al., 2006, p. 2097).The control group will then do standard task practice and these are replicated tasks; for example, eating or writing for 15 to 20 minutes. The participants also under went former based behavioral training to help work with motor learning. They would put the mitts on while they were in the laboratory, but required to actually wear the mitt outside the laboratory to practice 2 to 3 daily tasks at home. After the 2 weeks of wearing the mitt, participants were required to perform about 30 minutes of task practice daily following completion of the intervention period. They tested the WMFT and the MAL outcome measured between both groups at 4, 8, 12 months thereafter.

6.)The implementation of data collection procedures includes a test called the Wolf Motor Function Test and the MAL, which is called real world arm-use. The WMFT

test contained 15 timed and 2 strength test task that included lifting and weighted limb and grip strength. The items that they chose to pick up for the strength test are paper clips, stacking checkers, clips, paper, 3 notes cards and turning a key in a lock. The way they were able to see what the scores of these tests were to blind a group trained observers were sent a video tape for each evaluation and were to rate the quality of movement on a scale of 6 points. The administers of these tests to the participants timed the time it took them to finish a task. The other test that was implemented was from collecting from 11-point Quality of Movement Scale and how much the paretic arm was used for certain home activities. The caregiver rated the rating for this movement if they were present and if not they would rate themselves. There were 5 tests that were conducted baseline, post-treatment follow-up at 4-8, and 12 months by trained staff blinded to group assignment.

7.) The critique the choices made for conducting the analysis:

The descriptive statistical test that they used was frequency distribution, measures of central tendency, and central tendency distribution. The inferential statistical test that were used to analyze the research were stated in the article as,

Wolf ‘s et al. (2006) study found the following;

> These statistical analyses were validated by examining alternative analyses; in particular, analysis of covariance at each time point, with the corresponding baseline value used as a covariate; repeating the analyses applying an alternative definition of functional level using score on the motor component for the Fugl-

Meyer Upper Extremity Assessment to more equally balance the sizes of the functional groups; including clinic in the model and testing for interactions between clinic treatment condition; using a last observation-carried-forward approach for missing data; and using only observation for which the visits were in the prescribed time window." (p. 2098) They also accounted for age, and side of the stroke.

8.) The researchers had both descriptive statistics and inferential statistics tests in this study. The used these approaches to minimize the risk of sample corruption, to eliminate outside variables as potential causes for a false null hypothesis. The researcher ultimately concluded that constraint- induced movement therapy produced statistically-meaningful and clinically relevant improvements for patient who had experienced their first stroke between 3 and 9 months prior to the study, specifically with regard to their paretic arm motor ability and use. These improvements seemed to be across the board, regardless of age, sex, or initial level of paretic arm motor ability. The researchers also concluded that further researcher in this area is warranted.

It makes there data more meaningful in such the they compare there performance of like groups rather than looking at gross result. When they compare the two groups the way they compare data from the CIMT group they compare low performance to high performance.

9.)Interpretations of their findings. This experiment was the largest multicenter trial and the largest trial of CIMT among participants who had experienced stroke 3-9

months prior. In the CIMT group, there was an extreme amount of improvement after the treatment in the CIMT group. They improved in the quality and speed of their paretic arm movement and in the quality and amount of paretic arm use in daily life compared to the control group. The control group did improve, but the amount of improvement was only a slight increase from baseline. The author mentions that the re-test reliability studies of WMFT and MAL were tested on long-term patients who could have had a stroke in the last couple years. In the studies done before could have been decency because this study had set criteria that the participants had to have been within a 9-month post-stroke period. I think they should have used participants that had the same set criteria if they were going to re-test the study. They can't really compare this study to another study unless they re-do the study with almost identical criteria. When the controlled group and the CIMT were compared on how much they used less-impaired arm to help with tasks after 12 weeks the results had tripled. The control group used the non-affected arm to help the affected arm 3 times as much. The CIMT group improved most on the Performance Time and the Functional Ability scale because the training was on the number of repetitions of each task is what they spent the most time doing. At the end they also performed a transcranial magnetic stimulation study that allowed them to see an increase in the cerebral cortex representation of paretic hand muscles in the participants brains. This study had several limitations. In this study, they had separated the two groups by CIMT and the control group, but in both groups they had categorized the two groups into higher-functioning group and lower-functioning group. The sample size is too small is too small to be able to accurately compare functional levels because the data would be skewed. The intensity of treatment between the CIMT group and the usual care group

was not comparable. Therefore mitigates the conclusiveness of the study. Although, in this study, statistically from this study's results they have found that there was a statistically significant difference between the CIMT and the usual care after the CIMT received two weeks of treatment.

10.) Overall, this study was ethical and reasonable by trying to re-test another study. One of the goals of this study was to try to replicate this study from a previous study done with long-term participants. The previous studies had used the MAL and the WMFT tests measure the progress of the participants. In this study it was unfornuate that they didn't come as close to replicating the study. The participants had to have had a stroke in the last 9 months for them to participate in the study and in the studies that they were trying to replicate didn't have a time frame just that they had a stroke sometime from a long-term care facility. The other difference from the other single site experiments was this excite randomized clinical trial studied these participants for a longer period. They followed up with the participants at 4, 8 and 12 month. The other studies were significantly shorter. They should have focused on changing one of the variables and this would have reduced the internal threats; for example, shorting the time to decrease the deaths in the study. I thought they did try to work with the mistakes they had realized after the study. I am glad they were able to proceed with a study from this and learn from their mistakes, but I hope if someone replicates a study they will only change one variable from the previous studies to get an accurate reading on if there were improvements with the group who had CIMT verses the group who received usual care.

Reference

Wolf, L.S., Winstein, J.C., Miller, P.J., Taub, E., Uswatee, G., Morris, D., Giuliani, C., Light, E.K., Nicholas Larson, D. (2006). *Effect of Constraint-Induced Movement Therapy on Upper Extremity Function 3 to 9 Months After Stroke: The Excite Randomized Clinical Trial*. American Medical Association, 296 (17), 2095-2104.