

S #10

Inflatable pressure splinting did not improve motor function in stroke patients' arms

Poole, J. L., Whitney, S. L., Hangeland, N., & Baker, C. (1990). The effectiveness of inflatable pressure splints on motor function in stroke patients. *Occupational Therapy Journal of Research*, *10*, 360–366.

Level IC2b

Randomized controlled trial, less than 20 participants per condition or group, moderate internal validity, moderate external validity

Why research this topic?

Occupational therapists use inflatable pressure splinting to improve function in stroke clients' impaired arms. As of the late 1980s, though, only two studies had assessed the effects of this kind of splinting, and the results were contradictory. A major difference between the two studies was the length of the treatment period: 5 days versus 2 weeks. The positive results occurred with the longer period, but the study had only one subject.

What did the researchers do?

Poole and colleagues (1990), variously of the University of Pittsburgh (Pennsylvania) and Harmarville Rehabilitation Center (Pittsburgh), evaluated the effectiveness of inflatable pressure splinting with a larger group of subjects and a longer treatment period. The participants in the study were 18 stroke patients (gender not reported), whose average age was 70 years. They first were matched in pairs according to their upper-extremity motor scores on the Fugl-Meyer Assessment. Then one of each pair was randomly assigned to a splinting condition, and the other was assigned to a nonsplinting condition.

The splinting condition involved participants wearing an inflatable pressure splint made of clear plastic. The splint was slipped over the arm and hand and then inflated. The effect was to keep the arm externally rotated (rotated outward); the elbow, wrist, and fingers straight; and the thumb abducted (drawn away from the midline of the hand). The participants wore the splint for 30 minutes a day, 5 days a week, for 3 weeks.

Both groups also received traditional occupational therapy.

The researchers were interested in the following outcome area: **sensorimotor** (*see Glossary*) *function* (as measured by subscales of the Fugl-Meyer Assessment: sensation; pain; and motor function of the upper arm, wrist, and hand).

What did the researchers find?

There were **no significant** (*see Glossary*) differences between the groups. For the group that wore the splints, the overall **effect size** (*see Glossary*) was small.

Both groups improved **significantly** (*see Glossary*) on the sensation and motor function subscales of the Fugl-Meyer Assessment. The mean effect size was large.

What do the findings mean?

For therapists and other providers, the findings suggest that inflatable pressure splinting does not add significantly to the outcome of occupational therapy directed at remediating motor function after stroke.

What are the study's limitations?

First, the treatments may have been unequal. Both groups received similar conventional therapy for the same amounts of time, but the experimental group received the experimental treatment for 30 additional minutes each day.

Second and third, the occupational therapy intervention received by both groups (not described) or spontaneous recovery or both may have caused the significant improvement seen in each group. The time since stroke was not reported, but because the patients were receiving daily occupational therapy, they probably were in the acute stage, when spontaneous recovery occurs with or without therapy.

Glossary

effect size (Cohen's *r*)—An effect size is a measure of clinical significance. It provides information about the magnitude of effect of the treatment. Although related to significance, it is not as influenced by the size of the sample. Therefore, it is possible to have an outcome on which the treatment had a large effect (i.e., the treatment group improved a lot more than the control group) and still have a non-significant result. If the results have a large effect but no significance, this means that this effect may be sample specific and not generalizable outside the study. There are many different types of effect sizes. What is reported here is Cohen's r. Cohen's r can be interpreted in a manner similar to a Pearson's correlation coefficient:

Effect size r	Size of the effect
< 0.99	Negligible
0.10-0.29	Small
0.30-0.49	Medium
>0.50	Large

Cohen, J. (1977). Statistical Power Analysis for Behavioral Sciences. New York: Academic Press.

nonsignificant or no significance—A statistical term that refers to study findings that are likely to be due to chance differences between the groups rather than to other factors (like the treatment of interest). A nonsignificant result is not generalizable outside the study. Like significance, a nonsignificant result does not indicate the clinical effect. Often studies will show nonsignificant results, yet the treatment group's mean will be better than the control group's. This is usually referred to as a trend in the right direction. Because significance is closely determined by sample size, nonsignificant results would often become significant if the sample size were increased.

sensorimotor—"of, relating to, or functioning in both sensory and motor aspects of bodily activity" (Merriam Webster's Collegiate Dictionary, 10th ed., p. 1066).

significance (or significant)—A statistical term, this refers to the probability that the results obtained in the study are not due to chance, but to some other factor (such as the treatment of interest). A significant result is one that is likely to be generalizable to populations outside the study.

Significance should not be confused with clinical effect. A study can be statistically significant without having a very large clinical effect on the sample. For example, a study that examines the effect of a treatment on a client's ability to walk, may report that the participants in the treatment group were able to walk significantly longer distances than the control. However, if you read the study you may find that the treatment group was able to walk , on average, six feet, while the control group was able to walk, on average, five feet. While the outcome may be statistically significant, a clinician may not feel that a one foot increase will make his or her client functional.

Terminology used in this document is based on two systems of classification current at the time the evidence-based literature reviews were completed: Uniform Terminology for Occupational Therapy Practice—Third Edition (AOTA, 1994) and International Classification of Functioning, Disability and Health (ICIDH-2) (World Health Organization [WHO], 1999). More recently, the Uniform Terminology document was replaced by Occupational Therapy Practice Framework: Domain and Process (AOTA, 2002), and modifications to ICIDH-2 were finalized in the International Classification of Functioning, Disability and Health (ICIDH).

This work is based on the evidence-based literature review completed by Hui-ing Ma, ScD, OTR, and Catherine A. Trombly, ScD, OTR/L, FAOTA.

For more information about the Evidence-Based Literature Review Project, contact the Practice Department at the American Occupational Therapy Association, 301-652-6611, x 2040.



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