AOTA Evidence Briefs
Stroke

**A product of the American Occupational Therapy Association's Evidence-Based Literature Review Project*

S #15

Splinting may not reduce spasms in a paralyzed hand

Langlois, S., Pederson, L., & MacKinnon, J. R. (1991). The effects of splinting on the spastic hemiplegic hand: Report of a feasibility study. *Canadian Journal of Occupational Therapy, 58,* 17–25.

Level IC3c

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

Why research this topic?

Spasticity is "'a state of increased muscular tone with exaggeration of the tendon reflexes'" (p. 18). Occupational therapists use hand splints to reduce spasticity in stroke clients. However, the little research that has been done on the effects of splinting is contradictory. Among the unresolved issues are the ideal schedule for wearing a splint and the relationship between changes in spasticity and clients' expectations, satisfaction, and compliance.

What did the researchers do?

Langlois and colleagues (1991), of the University of Western Ontario (Toronto, Canada), studied the effects of three splint-wearing schedules on spasticity, and the relationship between clients' satisfaction with the splint and changes in spasticity.

The participants in the study were 3 men and 6 women whose average age was 64 years. They were recruited through the London Chapter of the Ontario Stroke Recovery Association, the Department of Occupational Therapy at Parkwood Hospital in London, and Home Care Services, London. All of them had a single diagnosis of stroke that had occurred at least 12 months before admission to the study and had resulted in spastic hemiplegia (total or partial paralysis of one side of the body). They were medically stable and free of other medical problems that could influence the degree of spasticity. Further, they were able to understand and cooperate with all test and treatment procedures, and none were involved in any other therapy designed to reduce spasticity.

The participants were randomly assigned to one of three groups: one group wearing the splint for 22 hours per day, the second group wearing it for 12 hours per day, or the third group wearing it for 6 hours per day. Each participant was given a "finger-spreader splint" to wear for 4 weeks, for the indicated number of hours per day. The client inserted his or her fingers and thumb into the splint, which held the digits about a half inch apart.

The researchers were interested in four outcome areas: *level of spasticity* (as measured by a device called a torque motion analyzer); *clients' expectations* (as measured by a 22-item questionnaire); *clients' satisfaction* (as measured by a 32-item questionnaire); and *clients' compliance* (as reported in a log and in a 5-item questionnaire).

What did the researchers find?

There were **no significant** (*see Glossary*) differences among the groups in reduction of spasticity. However, the group wearing the splint for 6 hours a day showed the greatest change in level of spasticity. Note that the authors of the article (Langlois, et. Al) reported that the group wearing the splint for 22 hours a day showed the greatest change in level of spasticity. However, reviewers of the article for this Evidence Brief recalculated the results using the scores reported in the article for each group. They found that the group wearing the splint for 6 hours had the most change. It is unknown whether the data was inaccurately reported or miscalculated.

The researchers found a **significant** *(see Glossary)* relationship between the expectations and compliance. They also found a significant relationship between satisfaction and compliance.

What do the findings mean?

For therapists and other providers, the findings suggest that splinting may increase spasticity, and that the longer a client wears the splint, the greater the increase. The findings were based on a small sample, however, so their generalizability is limited. Further research is needed.

What are the study's limitations?

First, the treatment may have been equalized by variations in compliance. Compliance varied from 50% to 80% of the time. Thus the patients on the longer wearing schedules could actually have worn the splints for shorter periods. Likewise, those on the shorter wearing schedule could have worn the splint for longer. (Indeed, the researchers found a significant correlation between expectation and compliance.) Because of this, the independent variable (wearing time—22, 12, and 6 hours) might not have been correctly implemented.

Second, the researchers' expectations may have influenced the results. The evaluation was not "blinded"; that is, it was done by someone who knew the study's hypothesis and/or the group assignments of the participants.

Third, there may have been a "placebo effect." That is, attention alone could have accounted for the results. There was no control group to preclude this possibility.

The small sample size is not a threat to the study's internal validity, but it probably contributed to the researchers' failure to detect a significant difference between the group on the 6-hour wearing schedule and the other groups. With more subjects, a difference would have been observed. (One can draw this conclusion because the **effect size** [see *Glossary*] was large.)

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.

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* (WHO, 2001).

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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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