



# AOTA Evidence Briefs

## Cerebral Palsy

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

### CP #2

## Neurodevelopmental therapy combined with casting may improve quality of upper-extremity movement and wrist extension in children with cerebral palsy

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Law, M., Cadman, D., Rosenbaum, P., Walter, S., Russell, D., & DeMatteo, C. (1991). Neurodevelopmental therapy and upper-extremity inhibitive casting for children with cerebral palsy. *Developmental Medicine and Child Neurology*, *33*, 379–387.

### Level IA1a

Randomized controlled trial, 20 or more participants per condition, high internal validity, high external validity

### Why research this topic?

There has been little investigation of the types of therapy that might improve the function of children with cerebral palsy. However, researchers have suggested that a combination of neurodevelopmental therapy and inhibitive casting will produce increased **range of motion** (see *Glossary*), improved quality of motion, and better hand function in children with cerebral palsy. In neurodevelopmental therapy, “the therapist uses movement and handling to alter [muscle] tone and to facilitate normal movement patterns and postural reactions” (p. 379). “For inhibitive casting, a cast is applied over a specific joint, such as the wrist or ankle, while it is in a functional, tone-inhibiting posture. Subsequently the cast is bivalved and worn for limited periods during the day and during therapy, allowing the limb muscles to work and become stronger and more functional” (p. 380).

### What did the researchers do?

Law and her colleagues (1991), variously of McMaster University (Hamilton, Ontario, Canada) and in private practice, decided “to study the effect of intensive [neurodevelopmental therapy] and casting, separately and in combination, on hand function, upper-extremity quality of movement and range of motion of children with cerebral palsy” (p. 380). They drew their participants from children attending three treatment centers in Ontario. Of 97 eligible children, they received consent for 79. Six subsequently dropped out, leaving a sample of 73 (28 boys and 44 girls). The children all were between 18 months and 8 years of age (no average reported). Data for one child was not included in the analysis at 9 months because of missed appointments but was included at baseline and 6 months.

The children were randomly assigned to one of four treatments: intensive neurodevelopmental therapy plus casting, regular neurodevelopmental therapy plus casting, intensive neurodevelopmental therapy alone, and regular neurodevelopmental therapy alone. Intensive neurodevelopmental therapy consisted of 45 minutes of treatment twice a week for 6 months, plus a 30-minute program at home once a day. Regular neurodevelopmental therapy involved treatment at least once a month, at most once a week, plus a 15-minute program at home three times a week. Casting involved the children’s wearing an inhibitive cast at least 4 hours a day as part of a home program.

The outcome areas of interest were *hand function* (as measured by the Peabody Fine Motor Scales); *quality of upper-extremity movement* (as measured by the Quality of Upper Extremity Skills Test); and *range of motion of the wrist*.

## What did the researchers find?

On the measure of hand function, there were **no** statistically **significant** (see *Glossary*) or clinically important differences after 6 or 9 months between the intensive and regular therapy groups, or between the casting and no-casting groups. However, intensive therapy plus casting produced change at an almost normal rate of development, compared with change at about half the normal rate in the other groups. This was clinically important but not statistically significant.

On the measure of quality of movement, the groups using casts showed **significant** (see *Glossary*) improvement after 6 months but not after 9. Casts were not worn after the 6-month assessment.

On the measure of range of motion, the casted arm showed a significant increase in wrist **extension** (see *Glossary*) compared with the uncasted arm.

On the contribution of different variables to outcomes, age and parents' compliance with home-therapy regimens proved to be significant predictors of change in hand function. In other words, "children who were younger and whose parents estimated their own compliance as high had better outcomes" (p. 384).

## What do the findings mean?

- The findings suggest that a combination of intensive or regular neurodevelopmental therapy and casting may improve upper-extremity quality of movement and wrist extension in children with cerebral palsy. The casting may need to be long term, however, because its effects may decrease over time.
- The findings suggest less strongly that intensive neurodevelopmental therapy plus casting can improve hand function. This possibility requires further investigation, especially with young children.
- The findings should boost confidence in funding programs that combine neurodevelopmental therapy with casting to improve upper-extremity quality of movement and wrist extension in children with cerebral palsy. The findings also suggest some directions for research: investigation of the effects of intensive neurodevelopmental therapy plus casting on hand function, using a larger sample and focusing on younger children.

## What are the study's limitations?

- Decreased power to examine interactive effect of intensive therapy plus casting group over time.
- Children in all groups missed many therapy appointments, and this may have affected difference on outcomes between groups. Authors did address this issue in the discussion.
- Generalization limited by diagnosis, age, and geographical area.

## GLOSSARY

**extension**—an unbending movement around a joint in a limb (as the knee or elbow) that increases the angle between the bones of the limb at the joint.

**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.

**range of motion**—arc of motion through which a joint passes.

**significance (or significant)**—A statistical term that 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, 6 feet, while the control group was able to walk, on average, 5 feet. While the outcome may be statistically significant, a clinician may not feel that a 1-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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