

The Use of Clinical Reasoning Frameworks in Care Planning: a Case Report
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Abstract

Background and Purpose:

Cavernomas are a rare type of brain arteriovenous malformation (bAVMs) affecting 0.5% of the population. Pediatric cavernomas account for 25% of all reported cases.^{1,2} Previous studies have examined physical therapy (PT) care planning and neuroplasticity in adults with bAVMs.

However, research on this topic is limited for pediatric patients. The purpose of this case report is to demonstrate the use of the International Classification of Functioning, Disability and Health model (ICF) and Hypothesis Orientated Algorithm for Clinicians (HOAC) in care planning for a pediatric patient with two cavernomas.

Case Description:

The patient was a 6 year-old male who had two craniotomies to remove cavernomas on his brainstem. Prior to the cavernomas the patient was independent with functional mobility and activities of daily living (ADLs). He was referred to outpatient physical therapy. PT measured passive range of motion (PROM), strength with manual muscle tests (MMTs), and light touch with a cotton ball. Functional mobility assessment looked at transfers, stairs, balance, gait and ADLs. Functional mobility was assessed using the timed up and go (TUG). The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition Short Form (BOT2-SF) (minimal clinically important difference: 6.5 points) was used to assess age appropriate motor skills.²² The patient presented with impaired neuromuscular control, strength, gait, balance, transfers and stair negotiation. The patient was recommended to receive PT one time a week for 30 minutes. Intervention planning was guided by the HOAC model, ICF model and neuroplastic principles. Interventions included neuro-muscular reeducation, proprioceptive neuromuscular facilitation techniques, re-integration of the left side in movement patterns, neurodynamic techniques, stretching, as well as gait, transfer, and stair training.

Outcomes:

On the last day of the student physical therapist's clinical affiliation the patient was independent in supine to stand transfers, incorporated the left side of body into car transfers and had improved overhead reach. At discharge the patient had PROM within normal limits, decreased strength on MMT and his TUG time decreased by 0.89 seconds.

Discussion:

Intervention planning was guided by the ICF and HOAC models. Interventions were designed to induce neuroplastic changes. The patient's consistent progress throughout the plan of care suggests that, in pediatric populations, neuroplastic changes can occur for longer after neurologic insult. However, further research is needed to understand the neuroplastic window in the pediatric population and the role of PT in rehabilitation for pediatric patients after neurologic insult.

Conclusion:

Using decision making models, particularly in rare patient cases, can assist PTs in creating comprehensive plans of care. Until the neuroplastic window for pediatric patients is understood, the models ensure that interventions were challenging the patient enough to induce neuroplastic changes and create functional improvements.

Key Words: cavernomas, neuroplasticity, ICF model, HOAC model