

Title: A 3-Phase Intervention Plan focused on NeuroDevelopmental Treatment for a Patient Following Hemorrhagic Stroke: A Case Report

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ABSTRACT

Background:

The greatest recovery for patients with intracerebral hemorrhage stroke is within the first 19-20 days after the initial onset, but the evidence is still lacking to support the interventions needed to maximize the recovery in this period.¹ One intervention being used is NeuroDevelopmental Treatment (NDT), it emphasizes the use of feedback and feedforward mechanisms to improve postural control utilizing key points of control to assist the patient in achieving active control of a movement.¹ This is important for stroke recovery because the goal of rehabilitation is to achieve functional mobility while minimizing the compensations used by a patient. There is limited evidence on how an emphasis of NDT in conjunction with other interventions will improve the functional mobility of patients who have had a stroke. The purpose of this case report is to assess the rapid recovery of a patient with a hemorrhagic stroke who was discharged home two weeks after admission with minimal assistance for functional mobility.

Methods:

A previously independent 59-year old male presented with a lateral pontine parenchymal hemorrhagic stroke, which resulted in right hemiparesis was admitted to an inpatient rehabilitation hospital for 14 days. On initial examination, the patient required maximum assistance from 2 people to perform a sit to stand transfer and was not ambulating due to safety concerns. The initial goals set included moderate assistance for bed mobility, transfers and maximum assistance for ambulation by 10 feet. During 2 weeks in inpatient rehabilitation, the focus of the intervention was on NDT in conjunction with postural alignment and part-task activities. NDT was utilized to re-enforce normal movement patterns to improve the patient's independence through the intervention phases that were determined by their level of assist and cues needed. The three phases of the patient's treatment included: Phase 1- Stability, Phase 2- Mobility, Phase 3- Ambulation. The description of the phases are in Table 2.

Results:

The patient demonstrated significant progress by exceeding the initial goals set and was discharged at a functional level higher than anticipated. Within the first week the patient met his bed mobility and transfer goals of moderate assistance and at discharge only required minimal assistance for these tasks. The patient ambulated 50 feet with two turns with an assistive device and minimal assistance at discharge. The patient was also able to ascend and descend up to 4 steps with moderate assistance. The goals set on initial examination compared to functional mobility at discharge is found in Table 1.

Discussion:

Incorporating normal movement patterns into the patient's intervention phases was important to elicit proper movement to allow for improvements in functional mobility. Progressing the patient through the different phases and may avoid compensations and promote corrections to body movements with minimal cueing. Applying NDT with part-task activities may allow for patients to increase awareness of normalized body movements. The positive outcome of this case highlights the need for increased research for NDT

combined with well-established interventions to determine their benefits for stroke rehabilitation. Also, the absence of an established definition of NDT needs to be addressed in order to properly study the impact of NDT on the stroke population.

Works Cited

1. O’Sullivan S, Schmitz T. Improving functional outcomes in physical therapy. 2010.

Table 1. Long Term Goals vs Discharge Outcomes

Long Term Goals	Assistance Level	Functional Activity on Discharge	Assistance level
Roll Left and Right	Mod A	Roll Left and Right	Min A
Supine to Sit	Mod A	Scooting	Min A
Sit to supine	Mod A	Supine to sit	Min A
Sit to stand/stand to sit	Mod A	Sit to supine	Min A
Stand to sit	Mod A	Sit to stand	Min A
Sit to sit transfer	Mod A	Sit to sit transfer	Min A
transfer bed→ supine→sit→chair	Mod A	Transfer bed: supine→sit→chair	Min A
Picking up object	SPV from sitting	Car transfer	Mod A
Walk 10 ft	Max A	Walk 10 ft	Min A with AD
Manual w/c -50ft 2 turns	SPV	Walk 50ft with 2 turns	Min A with AD

Assistance level-Min A (minimal assistance level), Mod A (moderate assistance level), SPV (supervision), Max A (maximum assistance); AD (assistive device)

Table 2. Interventions divided into treatment phases

Treatment Phases	Interventions	Sets & Repetitions
Phase 1: Stability Stretching Strengthening Part-task activities *Maximal Assist/Cueing	<u>Stretches:</u> Anterior Pelvic Tilt Hamstring Dorsiflexion <u>A-AROM:</u> Knee extension (quads) <ul style="list-style-type: none"> • Vibration or tapping <u>Strengthening:</u> Anterior pelvic tilt hold → Postural strengthening → Plantarflexion → <u>Part-task activities:</u> Sit<>squat Forward trunk lean Scooting	Stretches: 3x 1-minute hold (sessions 1-3) 3x 30 sec hold (sessions 4-8) A-AROM: 3 sets x 20-30reps Strengthening: 1 set of 3x 30-60 sec hold 2 sets – 10 reps x 5 sec hold 2 sets x 20 reps
Phase 2: Mobility Continue phase 1 AND: Dynamic balance Transfers Pre-gait activities *Moderate Assist/Cueing	<u>Dynamic balance:</u> Multi-dimensional reaching <ul style="list-style-type: none"> • Cone reaches • Balloon tapping <u>Transfers:</u> <ul style="list-style-type: none"> • Sit<>squat/stand • Squat pivot <u>Pre-gait activities:</u> Weight-shifting <ul style="list-style-type: none"> • A-P, side-to-side • Feet hip width apart • Staggered Lateral walking <ul style="list-style-type: none"> • Both directions Backwards walking <ul style="list-style-type: none"> • Emphasis on foot clearance 	Dynamic balance: 3 sets x 2 minutes Transfers: 2 sets x 10 reps Pre-gait activities: A-P: 2 sets x 1 minute Side-to-side: 2 sets x 1 minute Lateral walking 3 sets of 6 lengths x8ft Backwards walking: 3 sets of 6 lengths x8ft
Phase 3: Ambulation Continue Phase 1 &2 AND: Discharge Preparation Functional Mobility Patient Education *Minimal/CG Assist/Cueing	<u>Transfers:</u> <ul style="list-style-type: none"> • Between 4 chairs Car transfer Stairs Ambulating with AD <ul style="list-style-type: none"> • AD use education Patient/Family education	5x in SUV height (?) 2x 4 steps x 3 sets Household level (50ft)

A-AROM is Assisted Active Range of Motion. Vibration refers to high frequency vibration along quadriceps muscle belly. Tapping is a facilitating technique for hypotonia. A-P= anterior – posterior. AD-Assistive Device.