Physical Therapy Management of a Patient with Stroke Utilizing Muscular Facilitation Techniques in a Skilled Nursing Facility: A Case Report

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Background

- Stroke is the leading cause of serious long term disability in the United States
- Hemiparesis is a well-known impairment following stroke
- Trunk musculature asymmetry is also common and often overlooked when assessing a patient's muscular control
- Trunk musculature is an essential link between the upper extremities and lower extremities during activities of daily living.
- Impairments in trunk musculature can result in decreased safety and balance.

Purpose

The purpose of this case is to provide the framework for treatment and an overview of a care plan for a patient following stroke, with special attention to trunk musculature facilitation, in a skilled nursing facility.

Case Description

- Elderly Caucasian woman
- Right cerebrovascular accident and left hemiparesis
- 18 days in acute care at her local hospital, where she received daily physical therapy, occupational therapy, and speech therapy
- Transferred to a skilled nursing facility for continued therapy services, which she received 5-7 days per week for 8 weeks.
- Prior to admission she was living independently in a multi-level home and reported community ambulation, driving, and independence with all mobility and age appropriate activities of daily living.

Examination

Tests and measures were done at admission and again at discharge to get an objective picture of the patient's progress. Standardized functional testing, using the 10 meter walk test, was also administered at admission and discharge and intermittently throughout the episode of care in order to monitor progress and make adjustments to the plan of care, as well as for justification for continued physical therapy services.

Table 1: Tests and Measures at Admission and Discharge

	Initial Evaluation	Discharge
Bed Mobility		
Sit to Supine	S and increased time to complete task, less than optimal technique	I
Supine to Sit	S and increased time to complete task, less than optimal technique	I with increased time to complete task, min v/c for technique
Transfers		
Sit to Stand	CGA, using BUEs as part of BOS and v/c	I at best with 1 UE as part of BOS, occasionally incrased attempts required to stand; consistently demonstrates DS level with v/c for SHP and technique
Stand to Sit	CGA, using BUE as part of BOS and v/c to reach back to surface for controlled descent, 18" surface	DS- MI with increased time to complete task and occasional v/c for SHP
Surface to Surface	CGA, using BUE as part of BOS, moving to L and R; moving L requires increased v/c to effectively sequence step pivot transfer	I with 1 UE as part of BOS
Ambulation		
With 4-Wheel Walker	CI S 100'	800' with S-DS
Without Assistive Device	CGA 200'	300' with S; occasional CGA secondary to increased confusion
Stairs		
Ascending/ Descending	4 steps at 6.5" with B rails, CGA, and reciprocal pattern	12 steps at 6.5" with B rails, S, and reciprocal pattern
Safety		
Behaviors	Fair	Good; occasionally Fair secondary to periods of confusion
Strength		
RLE	4/5 for all motions	4+/5
LLE	3+/5 for all motions	4/5
Trunk Extensors	Able to activate and sustain	Able to activate and sustain
Trunk Flexors	Able to activate and sustain	Able to activate and sustain
Lateral Trunk Flexors	R: able to activate and sustain L: able to activate, unable to sustain without t/c during mobility tasks	L: able to activate and sustain 75% of the time without t/c during mobility tasks with increased fatigue
Posture		
Sitting	Posterior pelvic tilt	Neutral pelvis
Standing	L downward tilt to pelvis	Posterior Pelvic tilt and slightly forward head
Activity Tolerance	Normal activities cause fatigue	Age appropriate activities do not cause increased fatigue
Edema	None noted	None noted
Proprioception	Diminished in LLE	Diminished in LLE (increased from baseline)
Coordination (as reported by OT)		
Finger to Nose	L: decreased accuracy	L: increased accuracy with increased time
Rapid Alternating Movements (RAMs)	L: Dysdiadochokinesia	L: minimal dysdiadochokinesia
Serial Opposition	L: Impaired	L: increased accuracy with increased time
Gait Analysis		
With 4 Wheel Walker	L downward pelvic tilt with L stance, corrected with t/c to L lateral lumbar flexors	Narrow BOS with occasional scissoring gait pattern
Without Assistive Device	L downward pelvic tilt with L stance, corrected with t/c to L lateral lumbar flexors	Unsteady at times with narrow BOS and occasional scissoring gait pattern
Balance		
Sitting Static	Leans posteriorly	Good
Sitting Dynamic	Fair +	Good
Standing Static	CGA with BUE support	Fair +/Good; leans slightly L
Standing Dynamic	Poor	Fair + with 4WW; Poor + without AD
Pain		
VAS Scale	0/10	0/10
Cognition		
Orientation	A & O x 3 to person, place, and year	A & O x 3 to person, place, and year; occasionally A & O x 1 to person during "sun-downing" periods

L: Left; **R**: Right; **B**: Bilateral; **UE**: Upper Extremity; **LE**: Lower Extremity; **AD**: Assistive Device; **4WW**: Four Wheel Walker
CGA: Contact Guard Assistance; **CI S**: Close Supervision; **S**: Supervision; **DS**: Distance Supervision; **MI**: Modified Independence; **I**: Independent
v/c: Verbal Cues; **t/c**: Tactile Cues; **min**: Minimum; **SHP**: Safe Hand Placement; **BOS**: Base of Support; **A&O**: Alert & Oriented; **OT**: Occupational Therapy

Table 2: 10 Meter Walk Test

	Assistive Device	Level of Assistance	Score (seconds)	Gait Velocity (m/s)	Interpretation	Recommendations	Comments
Initial Evaluation	Without	CGA	16.69	.60	Limited Community Ambulator	Needs intervention to reduce fall risk	
4 Weeks	Without	CGA/Close Supervision	12.11	.83	Community Ambulator	Needs intervention to reduce fall risk	
	4WW	Close Supervision/ Supervision and tactile cues to lateral lumbar flexors	10.82	.92	Community Ambulator	Needs intervention to reduce fall risk	Patient stated "I feel less tired with the walker"
Discharge (8 weeks)	Without	Supervision	12.44	.80	Community Ambulator	Needs intervention to reduce fall risk	Patient shows increased steadiness with gait however gait abnormalities do persist
	4WW	Supervision/ Distance Supervision	11.59	.86	Community Ambulator	Needs intervention to reduce fall risk	Patient stated "I feel much more safe with the walker."
	4 WW	Tactile Cues to lateral lumbar flexors	10.70	.93	Community Ambulator	Needs intervention to reduce fall risk	Patient's gait abnormalities are improved with tactile cues.

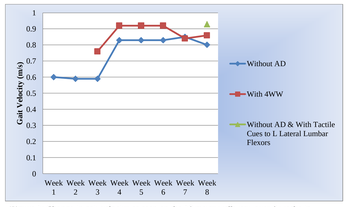

Figure 1: Change in gait velocity as seen on the 10 meter walk test over 8 weeks in physical therapy at a skilled nursing facility

Table 3: Patient Goals

Short Term Goals: To be completed within 1 week

1. The patient will transfer supine <> sit with verbal cues for technique and supervision in order to decrease burden of care.
2. The patient will transfer sit <> stand with supervision and verbal cues from an 18" surface with use of bilateral UEs as part of BOS, in order to decrease burden of care.
3. The patient will ambulate without an AD x 400 feet, with tactile cues less than 100 feet of the total distance in order to decrease her risk of falls.
4. The patient will ascend and descend 12 stairs at 6.5" with bilateral handrails and supervision in order to increase her safe access to her environment.

Long Term Goals: To be completed within 4 weeks

1. The Patient will independently transfer supine <> sit in order to decrease burden of care.
2. The patient will independently transfer sit <> stand and surface <> surface from a height greater than or equal to 17" without the use of UEs as a part of BOS, in order to decrease burden of care and to increase access to her environment.
3. The patient will ambulate without an AD and with distance supervision greater than 1000 feet and a gait velocity of 1.0 m/s or greater in order to increase access to her environment and to decrease fall risk.
4. Patient will ascend and descend 12 stairs at 6.5" with supervision and the use of one handrail in order to increase access to her environment.

UE: upper extremities; **BOS:** base of support; **AD:** assistive device

PT Diagnosis

Practice Pattern 5D: Impaired Motor Function and Sensory Integrity Associated with Non-Progressive Disorders of the Central Nervous System – Acquired in Adolescence or Adulthood.

Interventions

Table 4: Interventions

		Weeks 1 & 2	Weeks 3 & 4	Weeks 5 & 6	Week 7 & 8
Therapeutic Exercise	**ROM**	PROM to B hamstrings and gastrocnemius			
	Strengthening	Optimal sitting, seated LE exercises with 1# and red theraband	• Standing LE exercises with 2# and red theraband and BUE support		Standing LE exercises with 2# and green theraband with 1UE support
	Activity Tolerance	Continuous walking x 5 minutes with 10% BWS	Outside ambulation x 25 minutes with 4WW and >5 standing rest breaks	60 minutes continuous standing activity	Standing 12 minutes with dual UE task without UE support
Therapeutic Activities	**Bed Mobility**	• Supine <> sit • Rolling R and L • Side-lying <> sit	• Supine <> sit • Rolling R and L • Head <> foot of bed	• Supine <> sit	• Supine <> sit • Rolling R and L
	Transfers	• Sit <> stand • Bed <> WC	• Sit <> stand from a variety of surfaces • Surface <> surface • WC <> bed	• Sit <> Stand from 17" and 18" height with and without armrests • Surface <> surface with 1 UE BOS • Stand <> floor	• Sit <> stand with 5# weight • Sit <> stand with 1 UE support • t/c at lumbar extensors • Bed <> WC
	Patient Education	Use of the call bell to alert the nursing staff that she needs assistance	SHP during transfers and stair training	SHP during transfers and stair training	Family education regarding patient's DC to home & need for 24 hours of S
Mobility Training	**Gait Training**	150' x 2 at best without AD	• 700' with 4WW, inside over level surfaces • 375' with 4WW, outside over uneven terrain	• 800' with 4WW, inside over level surfaces • 25' x 4 without AD	125' x 2 without AD
	Stair Training		Ascend and descend 12 steps at 6.5" with B rails and reciprocal gait pattern	Ascend and descend 18 steps at 6.5" with R handrail and step to negotiation	Ascend and descend 12 steps at 6.5" with R handrail and reciprocal gait pattern
Neuromuscular Reeducation	**Balance Training**	Static Standing • Weight shifting R&L and fwd & back Optimal Sitting • Weight shifting R& L and fwd & back • Reaching R	Dynamic Standing • Figure 8s with 4WW • Straight line ambulation with 4WW • Obstacle course with 4WW Static Standing • reaching up to R with t/c at L lateral lumbar flexors	Dynamic standing • Balloon toss with forward stepping • Alternate step ups at 5" step, R and L with 4WW BOS Static Standing • reaching alternate heights and across midline with dual UE task • Reaching down to L with R UE and up to R with R UE	Static Standing (on blue foam board) • Closed stance with dual UE task and head turns • Tandem stance with B UE support • Semi-Tandem stance with dual UE task Biodex LOS • Skill level 12; R&L and fwd & back Dynamic Standing • Lateral side stepping to R&L • Later side steps up and over 6" height with BUE support
	Body Weight Support System	6.7-10% BWS • Single leg stance • Righting reactions • Lateral side stepping R&L • Backwards ambulation • Toe taps on 4" cone • Weight shift R&L and fwd & back		0%- BWS used for increased safety with new tasks • Alternating ball kicks R and L • Obstacle course without AD	
	Kinesiotaping	"I" strip to the L lateral lumbar flexors			
Aquatic Therapy	**Aquatic Therapy**	• Stairs in and out of the pool Backwards ambulation • Lateral side stepping • Backwards and lateral step ups • Static standing			

PROM: Passive Range of Motion; **R:** right; **L:** left; **UE:** upper extremity; **PF:** Plantarflex; **DF**: Dorsiflex; **LAQ**: long arch quad; **#:** pound; **BWS:** body weight support; **ADD**: Adduction; **ABD:** Abduction; **t/c:** tactile cues; **SHP**: save hand placement; **4WW**: 4 wheel walker; **min:** minimal; **mod:** moderate; **max**: maximal; **BOS**: base of support; **SI:** sacroiliac; **STM**: Soft tissue massage; **PPT**: physical performance testing; **fwd:** forward; **LOS:** limits of stability; **S:** supervision; **DC:** discharge

Interventions were progressed over time including longer and more complex neuromuscular reeducation activities, increased ambulation distances and decreased rest breaks. The patient did endure some regression during weeks 6 and 7 due to pain and confusion.

Figure 2: (from left to right) ambulation with tactile cues to the left lateral lumbar flexors; static reaching with tactile cues to left lateral lumbar flexors; sit to stand with tactile cues to the lumbar extensors.

Outcomes

- She met all of her short term goals and two of her long term goals. (LTG 1 & 4)
- She made significant progress towards her two unmet long term goals (LTG 2 & 3)
- She was able to complete ADLs, as well as transfers with modified independence and increased time.
- Due to cognitive changes and increased confusion, there was concern for her safety with return to independent living.
- Discharged to home with 24 hours of assistance provided by a private nursing company and her family
- Discharged with a 4WW for use in the community to increase stability and safety with ambulation
- She was able to participate in all of her prior activities, although she was unable to return to her prior level of independence in those activities.
- She increased her strength, activity tolerance, and ability to activate and sustain contractions of left lateral trunk flexors; however, she continued to experience increased fatigue in the left sided musculature compared to the right.

Discussion

Physical therapy has the potential to make significant improvements in a patient's overall function following a stroke. With proper muscular facilitation techniques it is possible that patients may make even greater gains during their time in rehabilitation

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