12-4-2015

The Effects Of Specific Training On Balance And Ambulation In A Patient With Stage IV Glioblastoma: A Case Report

Matt Denning
University of New England

The Effects of Specific Training on Balance and Ambulation in a Patient with Stage IV Glioblastoma, a Case Report.

Matt Denning

M Denning B.S, CSCS, NSCA-CPT, is a DPT student at the University of New England, 716 Stevens Ave. Portland Maine 04103

Address all correspondence with Matt Denning at: mdenning@une.edu

The patient signed an informed consent allowing the use of medical information for this report and received information on the institution's policies regarding the Health Insurance Portability and Accountability Act

The author acknowledges Brain Swanson PT, DSc, OCS, FAAOMPT for assistance with case report conceptualization and Kaitlyn Guyon DPT for supervision and assistance.

Abstract

Background and Purpose: A Diagnosis of stage IV Glioblastoma and its treatment often results in many impairments and functional limitations. This case report describes the effectiveness of strengthening, balance, and gait training activities measured by Berg Balance Scale (BBS) and ambulation distances on an individual 62 year old diagnosed with stage IV glioblastoma. The aim of this case study was to implement strengthening, balance, and gait training to improve balance and reduce risk of falls in a patient who had a diagnosis of stage IV glioblastoma, a metastatic brain tumor resulting in progressive neurological impairments.

Case Description: A 62 year old male, with a diagnosis of glioblastoma received balance training, strengthening, and gait training exercises 40 minutes per session 6 times a week for 8 weeks. The patient would performed gait training, balance and strengthening exercises using neuro-developmental treatment, facilitated movement, and task oriented interventions each session. The BBS and ambulation distances were utilized to assess patient's balance, coordination, and fall risk.

Outcome: Improvement in balance and coordination were observed, with increased stability in developmental postures and increased ambulation distances tolerated. Overall there was a decrease in the patients Berg Balance Scale score 27/56 to 18/56.

Discussion: The findings suggest there are possible benefits of strengthening, balance and gait training activities, including improvements in tolerance to ambulation, coordination and balance following practice in developmental postures. However there was no objective evidence of improvements in independent functional activities and a decline in their BBS score perhaps due to the progressive nature of the disease. Further research

should be done to examine the relationship between physical therapy interventions and functional restoration for patients with glioblastoma.

Background and Purpose

From 2005-2009 there were 1009,605 incidences of malignant brain tumors reported in the united states.[14] Specific incidence rates for malignant brain tumors ranged from 5.8 to 11.70 per 100,000 adults 20 years or older.[14] Glioblastoma is a malignant brain tumor often found in the cerebellum, which frequently affects the central nervous systems supporting glial cells.[4] These tumors are characterized by the presence of necrotic cells and increased vascularization around the tumor.[4,1] Glioblastoma, which is the most common neoplasm usually effecting people in the 5th or 6th decade of life, is categorized from stages I through IV depending on the rate of growth and size of the tumor. Stage IV is the most rapidly growing and invasive glioblastoma.[21] These tumors may increase intracranial pressure, causing multiple symptoms and impairments depending on the size and location of the mass. [4] Common symptoms in patients with glioblastoma may include headaches, seizures, memory loss, language dysfunction, hemiparesis, and change in behavior, cognition, and/or sensation. [4]

Treatment of glioblastoma frequently involves surgery to excise the tumor followed by radiation therapy with the intent to destroy any remaining cancer cell is common practice in treating patients with stage IV glioblastoma.[4,21] Similar to the growing malignancy, these treatments often cause further progressive and even rapid neurological impairments due to their toxic nature.[1] Unfortunately even with treatment the prognosis for patients diagnosed with a high grade glioblastoma is relatively poor with a mean survival rate of 12 to 18 months.[21]

Despite the high rate of neurological and functional impairments in patients affected by brain tumors, there is not a well-established rehabilitation treatment for these patients.[2] Many tudies have shown the potential benefits for patients receiving physical therapy after a diagnosis of a cancer, but few have focused solely on malignant brain tumors. Studies have shown that participation in physical therapy after tumor resection resulted in improved outcomes, including gains in functional status and higher rates of discharge to home with physical therapy after tumor resections.[1] Preoperative rehabilitation may not only help reduce length of stay, but may also decrease postoperative complication rates in patients undergoing surgery with different types of cancers.[1] A comparison study between patients receiving physical therapy and patients solely receiving the usual radiation oncology care found physical therapy to be beneficial in preventing a decrease in patient's quality of life.[1] Despite the many potential benefits of physical therapy for patients diagnosed with cancer many still do not receive any rehabilitation. A cross sectional survey in Seoul, Korea in 2008 looked at 402 patients who had a diagnosis of cancer and found out that 83.8% of the patients experienced problems with functional activity and 71.6% expressed interest in rehabilitation, yet only 8.5% of these patients had ever been referred to physical therapy after their diagnosis.[13] Due to the poor prognosis of patients diagnosis of Stage IV glioblastoma, there is limited information regarding physical therapy's effects on the functional status of a patient within this patient population.

The purpose of this case report is to provide an overview of the specific physical therapy management strategies used during an in-patient rehabilitation stay for a patient with a diagnosis of stage IV glioblastoma. This case details the effects of physical

therapy interventions on the patient's functional abilities, as measured by the BBS and ambulation distances.

Case Description

The patient provided written informed consent for participation in this case study. He was a 62-year-old married male and father to a child diagnosed with Down syndrome. He had an extremely positive demeanor and very strong family and social support system upon admission. He was residing at a skilled nursing facility after sustaining a fall, without injury, two weeks after being diagnosed with a right sided brain mass. Chief complaints at the initial evaluation included left sided weakness and unsteadiness.

He reported being in good health and very active before his diagnosis of cancer. Along with general good healthy habits he denied any history of smoking, drugs, or alcohol abuse. The patient had no family history of cancer, his past medical history consisted of hyperlipidemia, type II diabetes, hypertension, and stage IV glioblastomia with right brain mass. Medications are listed in Table 1.

At the start of care the patient was independent at wheel chair level requiring moderate assistance and an assistive device during all functional transfers, ambulation, and performing stairs. He required supervision to perform bed mobility due to increased impulsivity, decreased safety awareness, left sided inattention and left sided hemiparesis. Results of a full systems review are provided in Table 2.

The patient and family expressed a chief goal to be able to walk with modified independence, using a front-wheeled walker, within the home and community without sustaining a fall.

Clinical Impression 1

Upon review of the patient's history and medical chart it was hypothesized the patient's impairments were left sided hemiparesis, increased impulsivity, and decreased safety awareness secondary to the diagnosis of stage IV glioblastoma. These primary impairments had led to decreased balance and increased fatigue, which increased his risk of falls. His activity limitations were difficulty walking and performing functional transfers, which limited his ability to participate in most functional activities and many activities of daily living without assistance. Further tests and measures done to confirm the hypothesis were Manual Muscle Tests, Berg Balance Scale, ambulation distance tolerated, light tough sensation, range of motion, and deep tendon reflexes. This patient continued to be a good candidate for a case report due to the lack of research reporting the effects of physical therapy treatment for improving balance and decreasing fall risk in patients with stage IV glioblastoma.

Examination

The examination focus was to assess the patient's functional abilities and determine his fall risk due to being referred to the skilled nursing facility after sustaining a fall secondary to a recent diagnosis of stage IV glioblastoma. Due to facility protocols, physical therapists addressed the patients's lower extremity impairments, functional mobility and transfers while occupational therapists addressed patient's upper extremity impairments and activities of daily living. A plan for the examination was developed and executed by evaluating pain using the Visual Analogy Scale for current pain, range of motion using goniometry, sensation testing with light touch, manual muscle testing, deep tendon reflex testing, coordination testing using rapid alternating movements of heel to

shin, functional transfers, bed mobility, ambulation distance tolerance with assisted device (front wheeled walker), as well as the BBS to assess the patients risk of falling. For results of tests and measures see Table 3. The BBS was chosen due to its recommendation from the Traumatic Brain Injury Task Force for use in this population as well as its reported excellent test re-test reliability.[17] Other psychometric properties have not been identified for the BBS in patients with brain tumors. Although validity and reliability are not documented for the BBS with this population, this assessment tool has been found to have excellent validity and reliability in identifying fall risk for populations who have impairments and balance dysfunctions similar to the patient in this case report, making it a beneficial outcome tool to quantify the patients fall risk and balance dysfunction.[15,19] A significant decrease in patients in sight and safety awareness were noted during the patient's evaluation.

Clinical impression 2

The patient's primary impairments were left sided hemiparesis, increased impulsivity and decreased safety awareness. These lead to secondary impairments of decreased balance and decreased endurance. Subsequently the patient required the use of a front-wheeled walker and contact guard to maximum assistance when ambulating or performing functional transfers, which greatly restricted his ability to participate in functional tasks and ability to work. The combination of the left sided hemiparesis and lack of safety awareness put the patient at an elevated-risk of falling also indicated on the BBS. (table 3)

The primary diagnosis taken from the Guide to Physical Therapy was "Impaired motor function and sensory integrity associated with progressive disorder of the CNS."

This diagnosis was chosen given the malignant nature of glioblastoma. The ICD-9 code 719.7, difficulty walking, was the physical therapy diagnosis due to the patient's primary concern, his inability to ambulate independently.

The patient's prognosis was fair to make functional improvements with physical therapy due to the aggressive and progressive nature of the patient's tumor. As highlighted earlier, there continues to be improving evidence on the benefits that physical therapy and other therapies can have for patients with brain tumors. However, it is difficult to predict what functional improvements may be seen through therapy.

A plan of care was developed consisting of the patient being seen 40 minutes per session, six times a week while continuing his radiation and other treatments. Short and long term goals were developed. (Table 4) Therapy sessions involved neuromuscular re-education, gait training, and therapeutic exercises with the goals of increasing the patient's functional abilities and decreasing his risk of falls by addressing his impairments. The patient participated in balance training using neurodevelopmental postures utilizing different surfaces, level of support, and incorporating dynamic activities. Each posture was initiated in a static position, with the patient attempting to maintain the posture. It was then progressed to maintenance of the posture while performing a dynamic activity. The posture was then progressed again to maintain the position statically on an unstable surface, and finally to the performance of the posture on an unstable surface while performing a dynamic activity. Once all of these progressions had been successfully accomplished the patient then progressed to the next, more challenging neurodevelopmental posture. The patient also performed gait training using a

front-wheeled walker with manual assistance provided by the therapist, with the goal to improve his functional endurance and tolerance to ambulation.

The patient was reevaluated after every 10th session and performed all tests and measures performed during the initial examination. (Table 3).

Intervention

The patient received 48 sessions of physical therapy over a period of 12 weeks. He was scheduled for 45-minute daily treatment sessions, six times a week. Therapy session length varied slightly depending on patients fatigue levels and compliance during each session.

Coordination, communication, and documentation:

Initial evaluation and each session was documented using electronic medical system and any changes in the plan of care were noted at time of change. Communication with patients, family, in house physician, occupational therapy, speech therapy, and nursing staff was done though electronic medical system and verbal communication about patients level of current status. The therapy team communicated about the patients continued need for skilled therapy and discharge status at weekly meetings.

Patient, Client, and family related instructions:

The patient was educated about his current conditions, safety recommendations and physical status at initial evaluation. Plan of care was established at initial evaluation, which would entail strengthening, balance training, and gait training. Due to the impulsive nature of the patient, secondary to his diagnosis of stage IV glioblastoma, instructions were given frequently. Simple one and two-step commands were used to

encourage understanding. Visual cues using a mirror and demonstrations, along with tactile cueing with manual support were used to further improve the patient's understanding and success performing interventions. The patient was informed of the safety recommendations of remaining at the wheelchair level without assistance and the required home modifications. The recommended home modification included removal of throw rugs, installation of grab bars, shower chair, and constant supervision due to patient's elevated fall risk.

Procedural interventions:

The plan of care was developed with flexibility to allow changes to the length of individual sessions dependent on the patient's fatigue levels or compliance. The patient often presented with variable level of fatigue and agitation, requiring modification of individual treatment session length. The interventions provided including interventions of neuromuscular reeducation using neurodevelopmental postures to address the patient's stability. The re-educational activities then progressed to mobility once success had been established in static postures.[20] The patient began by obtaining neurodevelopmental postures. (Figure 1) He then attempted to maintain the posture statically with contact guard to moderate assist, visual cues with mirror, and maximum to minimal verbal cues from therapist to maintain proper posture for 15 to 30 seconds. This was performed 3 to 5 times with adequate rest breaks determined by patient's fatigue. Once the patient successfully maintained postures statically with minimum assistance and cueing the posture was progressed to include performance of a dynamic activity. Dynamic activities included reaching across midline, overhead, to the floor, picking up objects, throwing and catching objects, and other functional activities. Once successful at maintaining posture

with dynamic activities the intervention was progressed to an unstable surface using a blue Therex foam reference. The progression of static to dynamic would again be used while on an unstable posture. After all four progressions had been successfully completed within the neurodevelopmental posture, a new more difficult posture would be introduced from which the patient went through the progressions again. (Table 5)

Gait training was performed with a front wheel walker and intermittent therapist assistance, maximum assistance to contact guard, to improve the patient's functional mobility and tolerance to activity with the goal of improving endurance. Ambulation distance was increased as the patient successfully performed distances with decreasing level of therapist assistance required. (Table 5).

These interventions and progressions were chosen due to previously demonstrated benefits of performing balance and coordination training on functional abilities for populations with brain tumors and other neurological conditions.[11,20]. The interventions provided stemmed from theories of neurodevelopmental patterns, stability being necessary before controlled mobility, and the task oriented approach to rehabilitation and their successful application with neurological populations.[20] The goal of each interventions was to improve the patients functional abilities by normalizing movement patterns, repetitive practice, and improving strength, stability, and endurance.

These Interventions were provided throughout the entirety of the patient episode of care.

Outcomes

An increased ambulation distance was demonstrated; however an initial decline in Berg Balance Scale score followed by a slight increase in score, which remained below

patients initial evaluation score, was noted. (Table 6). The patient was unable to make progress towards his goal of walking independently, requiring the use of an assistive device and maximal assistance to contact guard during ambulation.

Discussion

The prognosis for patients with brain tumors is generally not favorable with a five-year survival rate of 33.9%.[14] Due to the aggressive nature of stage IV glioblastoma the survival rate decreases further, ranging from 12-16 months.[21] Although many factors can affect the prognosis such as patient's age, length of symptoms, and type of tumor; they all pointing in a less favorable direction for the patient's prognosis and rehabilitation potential.[14] The patient had a fair prognosis for therapy due to the fact stage IV glioblastoma is one of the most aggressive brain tumor, his sudden onset of symptoms, progressive decline of functional abilities, advanced age, and pre-existing co-morbidities.

With little research identifying relationships between physical therapy and glioblastomas, this case report highlights possible interventions and progression for a patient within this population. These interventions and progressions were chosen due to previously demonstrated benefits of performing balance and coordination training on functional abilities for populations with brain tumors and other neurological conditions.[11,20] The interventions provided stemmed from theories of neurodevelopmental patterns, stability being necessary before controlled mobility, and the task oriented approach to rehabilitation and their successful application with neurological populations.[20] The goal of each interventions was to improve the patients functional abilities by normalizing movement patterns, repetitive practice, and improving strength, stability, and endurance.

Possibly due to the progressive nature of the disease, there was a decline in the patient's Berg Balance Scale indicating an elevated fall risk from initial evaluation to discharge. While other findings have suggested possible improvements in balance with patient populations with less aggressive brain tumors or similar impairments, those results were not seen in this case.[1] An improvement was noted in the patient's ability to maintain and function within each neurodevelopmental posture from initial evaluation to discharge. An increase in ambulation distance was noted over the patient's episode of care, but no prior research was identified relating patient's diagnosed with stage IV glioblastoma or brain tumors and physical therapies effect on endurance measured by ambulation distances.

This case report suggests a possible benefit of selective therapy, using gait training and neurodevelopmental postures, to improve strengthening, balance and endurance within this population. Future research on the effect of physical therapy on functional ability for patients with stage IV glioblastoma and other brain tumors is needed to identify further definitive benefits for these patient populations.

References

1. American Cancer Society. Cancer Facts and Figures 2015. Atlanta: American Cancer Society; 2015.
2. Bartolo M, Zucchela C, Pace A, et al. Early Rehabilitation after Surgery Improves Functional Outcomes in Inpatients with Brain Tumours. J Neurooncol. 2012:107(3):537-44.
3. Berg Balance Scale Score Sheet.
4. Dolecek T, Propp J, Stroup N, et al. CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in The United States in 2005-2009. Neuro-Oncol. 2012; 14: 1-49.
5. Fan E, Ciesla ND, Truong AD, et al. Inter-rater Reliability of Manual Muscle Strength Testing in ICU Survivors and Simulated Patients. Intensive Care Med. 2010;36(6): 1038-43
6. Gilchrist L, Galantino M, Wampler M, et al. A Framework for Assessment in Oncology Rehabilitation. PHYS THER. PHYS THER. 2009;89:286-306
7. Glioblastoma and Malignant Astrocytoma. American Brain Tumor Association. Chicago, IL.
8. Hawker G, Mian S, Kendzerska T, et al. Measures of Adult Pain: Visual Analog Scale for Pain(VAS Pain), Numeric Rating Scale for Pain(NRS Pain), McGill Pain Questionaire (MPQ), Short Form Mcgill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale(CPGS), Short Form-36 Bodily Pain Scale(SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). Arthritis Care Res. 2011:63(11):240-252.

9. Hill C, Nixon C, Ruehmeier J, et al. Brain Tumors. Phys Ther. 2002;82(5):496-502.

10. Jong M, Elst M, Hartholt K. Drug Related Falls in Older Patients: Implicated Drugs, Consequences, and Possible Prevention Strategies. Ther Adv Drug Saf. 2013;4(4): 147-154.

11. Karakaya M, Kose N, Otman S, et al. Investigation and Comparison of the effects of Rehabilitation on Balance and Coordination Problems in Patients with Posterior Fossa and Cerebellopontine Angle Tumours. J Neurosurg Sci. 2000; 4,44:220-225

12. Khan F. Multidisciplinary rehabilitation after primary brain tumour treatment. *Cochrane Database Of Systematic Reviews* [serial online]. August 19, 2015;(8)Available from: Cochrane Database of Systematic Reviews, Ipswich, MA. Accessed September 22, 2015.

13. Kim YM, Kim D-Y, Chun MH, Jeon J-Y, Yun GJ, Lee MS. Cancer Rehabilitation: Experience, Symptoms, and Needs. *J Korean Med Sci*. 2011;26(5):619-624. doi:10.3346/jkms.2011.26.5.619.

14. Lacroix M, Abi-Said D, Fourney D, et al. A multivariate Analysis of 416 Patients with Glioblastoma Multiforme: Prognosis, Extent of Resection, and Survival. Journal of Neurosurg:2001;95:190-198.

15. Mao HF, Hsueh IP, Tang PF, et al. Analysis and Comparison of Pyschometric Properties of Three Balance Measurements for Stroke Patients. Stroke: 2002;33(4):1022-7

16. Merrel R. Brain Tumors. Disease-a-month. 2012;12;58:678-689.

17. McCulloch K, Joya A, Donnelly E, et al. TBIEDGE Task Force. Neurology Section. Neuropt.org

18. Nabors LB, Ammirati M, Bierman PJ, et al. Central Nervous System Cancers: Clinical Practice Guidelines in Oncology. *Journal of the National Comprehensive Cancer Network : JNCCN*. 2013;11(9):1114-1151.

19. Newstead A, Hinman M, Tomberlin J, et al. Reliability of the Berg Balance Scale and Balance Masters Limits of Stability for Individuals with Brain Injury. Journal of Neurologic Physical Therapy. 2005;29(1):18-23

20. O'Sullivan S, Schmitz T. Improving Funcitonal Outcomes in Physical Rehabilitation. Philadelphia, PA. F.A Davis Company. 2010.

21. Silver J, Baima J, Mayer S. Impairment-Driven Cancer Rehabilitation: An Essential Component of Quality Care and Survivorship. A Cancer Journal for Clinicians. 2013:63(5):295-317.

22. Tham L, Osman N, Abas W, et al. The validity and Reliability of Motion Analysis in Patellar Tendon Reflex Assessment. PLoS ONE. 2013:8(2).

23. Vargo M. Brain Tumor Rehabilitation. Am J of Phys Med and Rehabil. 2011;90(5):50-62.

Table 1.	
Medication	**Indication**
Acetaminiophen*	Pain
Glucagen Hypokit	Type II Diabetes
Enoxaparin Sodium	Blood thinner
Hydropchlorothiazide*	Hypertension
Levetiracetam*	Seizures
Lisinipril*	Hypertension
Metformin	Type II diabetes
Sertraline*	Depression
Famotidine	Stomach ulcers
Humalog	Blood sugar control
Butalbital-acetaminiphen-caffee	Head aches
Clonazepam	Anxiety
Trazidone*	Insomnia
Onadsetron	Nausea
Dexamethasone*	Anti-inflamatory
*Independent risk factor of increases fall risk[10]	

385

Table 2.	
Systems Review	
Cardiovascular/Pulmonary	Intact
Musculoskeletal	Impaired: Left Lower Extremity Manual muscle test grossly 4-/5, Right Lower Extremity 4+/5
Neuromuscular	Impaired: Left sided hemiparesis, Increased impulsivity, decreased safety awareness secondary to right sided brain mass. Bilateral lower extremity Coordination: RAMs intact, Bilateral lower extremity sensation intact: light touch.
Integumentary	Intact
Communication	Intact, Slight slur in speech secondary to brain mass
Affect, Cognition, Language, Learning Style	Alert and oriented to person, place, and time. English language, patient is a visual learner and able to follow multiple step directions.

386

387

388

389

390

Table 3.			
Test and Measure	**Admission**	**Discharge**	**Psychometric Properties**
Bilateral Lower Extremity Manual Muscle Testing	Right 4+/5, Left 4-/5 grossly	Right 4+/5, Left all 4/5 except ankle dorsi flexion 2-/5	Excellent test re-test reliability(ICC=.98) Sensitivity=.35 Specificity=.9[5]
*Berg Balance Scale	27/56 moderate fall risk	18/56 high fall risk	Test Re-test reliability, ICC .986 with patients with TBI[14,18]
*Ambulation Distance Tolerated	125 feet minimum to moderate assistance x1	500 feet contact guard to minimum assistance x1	N/A
Range of Motion	Within functional limits Bilateral Lower Extremity	Within functional limits	N/A
Bilateral Lower Extremity Deep Tendon Reflexes	2+ bilateral Patellar and Achilles tendons	2+ bilateral Patellar and Achilles tendons	P<.001 when comparing taping method & experimental method tapping velocity [21]
Bilateral Lower extremity Sensation	Intact, light touch dermatomes L1-S2	Intact light touch dermatomes L1-S2	N/A
Bilateral Lower Extremity Coordination	Bilateral rapid alternating movements: heel to shine, intact	Bilateral rapid alternating movements: heel to shine, intact	N/A
Pain VAS	0/10	0/10	Excellent Test Re-test reliability r=.94, P<.001[8]
Functional Transfers	Moderate assistance	Contact guard to moderate assistance	N/A
Bed Mobility	Supervision assistance	Supervision assistance	N/A
*Outcome measures used			

391

392

393

394

Table 4.	
Short-term Goals (2 weeks)	Long-term Goals (4 weeks)
1. Transition safety from supine to sitting on edge of bed with modified independence.	1. Ambulate community distances (300-500ft) with modified independence and front-wheeled walker.
2. Perform 7 stairs with bilateral railings and stand by assistance of therapist.	2. Improve Berg Balance Scale score to 40/56.
3. Perform all functional transfers with contact guard assistance and moderate verbal cues.	3. Improve MMT score to 5/5 of bilateral lower extremities.

395

396

Table 5				
Interventions	WEEK 1-2	WEEK 3-4	WEEK 5-6	WEEK 7-8
Neuromuscular reeducation	Quadruped balance activities.	High kneel balance activities	Half kneel balance activities	Standing balance activities
Progression	Abdominal support on stability ball	Manual support form PT	Manual Support from PT	Manual Support from PT
Static	Without Support	Without Support	Without Support	Without Support
Dynamic	Alternating reaching with B/L UE & LE	Reaching B/L UE	Reaching B/L UE	Alternating Reaching with B/L UE & LE
Static	On two inch foam mat	On Blue TherEx pad	On Blue Ther Ex pad	On Blue Ther Ex pad
Dynamic	Alternating reaching with B/L UE & LE	Reaching B/L UE	Reaching B/L UE	Alternating Reaching with B/L UE & LE
Gait Training with AD	50-100 feet	100-200 feet	200-300 feet	>400 Feet

397

398

399

400

401

Table 6						
Sessions	1	10	20	30	40	48
Berg Balance Scale Score	27/56 High Fall Risk	27/56 High Fall Risk	14/56 High Fall Risk	14/56 High Fall Risk	16/56 High Fall Risk	18/56 High Fall Risk
Ambulation Distance	125 feet	200 feet	200 feet	300 feet	300 feet	500 feet

402