

12-2018

Functional Mobility For An Elderly Patient With Amyotrophic Lateral Sclerosis: A Case Report

Gianna G. Pezzano
University of New England

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Recommended Citation

Pezzano, Gianna G., "Functional Mobility For An Elderly Patient With Amyotrophic Lateral Sclerosis: A Case Report" (2018). *Case Report Papers*. 100.
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24 **ABSTRACT**

25 **Background and Purpose:** This case report provides a detailed description of how balance
26 training was incorporated into physical therapy (PT) treatment to reduce fall risk and maintain
27 functional mobility in an elderly patient diagnosed with ALS. Due to lack of research on ALS,
28 and the terminal nature of the disease, clinicians and researchers may benefit from a palliative
29 care PT plan to maintain functional mobility for patients with neurodegenerative diseases.

30 **Case Description:** An 82-year old female presented to outpatient PT with the diagnosis of ALS,
31 with decreased functional mobility, high fall risk, and left hip/knee pain due to arthritis. She
32 received 13 sessions over 12 weeks. The outcome measures used include the Berg Balance Score
33 (BBS), Timed Up and Go (TUG) in seconds (s), 6 Minute Walk Test (6MWT) in meters (m), and
34 manual muscle testing (MMT).

35 **Outcomes:** Balance training was used throughout the sessions to decrease fall risk, as well as
36 therapeutic exercise to maintain strength for activities of daily living (ADL). Throughout
37 treatment, she demonstrated slight decline in function, but was able to maintain function within
38 the minimal clinically important difference (MCID). Maintenance of function was shown by the
39 6MWT (120 m to 126m) where distance was still within the MCID, and the TUG (23.75 s to 29
40 s) showed continued independence in transfers. Only slight decline in strength was shown in left
41 dorsiflexion (4 to 3+/5) and in balance on the BBS (37 to 29/56).

42 **Discussion:** PT serves an important role in palliative care for the maintenance of function in
43 neurodegenerative diseases and further research is needed to determine beneficial interventions.

44 **INTRODUCTION/BACKGROUND and PURPOSE**

45 Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disease that
46 affects the motor neurons within the corticospinal tract, brain stem, spinal cord, and primary
47 motor cortex.¹ Disease progression can occur with an initial *bulbar* or *limb* onset showing signs

48 of weakness, spasticity, paralysis, and abnormal reflexes, presenting with either upper motor
49 neuron or lower motor neuron dysfunction.¹ *Bulbar* onset refers to the medulla oblongata and
50 pons which control the bulbar muscles of the face, jaw, soft palate, larynx, pharynx, and tongue.²
51 With an initial onset of bulbar presentation, the patient demonstrates oral motor dysfunction
52 including dysarthria, dysphagia, and sialorrhoea.¹ In *limb* onset, muscle atrophy as well as
53 muscle fasciculation is common and typically presents around the age of 60.¹ As the course of
54 ALS continues, it can lead to respiratory and pulmonary complications.¹ In 2014, five people per
55 100,000 people, with most incidence in males, were living with ALS in the United States (US).^{1,3}
56 With ALS being a fatal disease, the mortality rate, in the US was 1.84 per 100,000 people in
57 2009.¹ ALS is typically diagnosed when other neurodegenerative disorders are ruled out.¹ A
58 recent awareness campaign that began in 2014, known as the “Ice Bucket Challenge”, has
59 increased public awareness and charitable funding for ALS, and highlighted the need for further
60 research is needed to determine appropriate plans of care for medical treatment and
61 rehabilitation.^{4,5}

62 Due to the rapid disease progression and complete motor loss, the care for patients who
63 have ALS requires a multidisciplinary approach.¹ Physical therapy (PT) plays a role in treatment
64 of patients with ALS to focus on maintaining independence and functional mobility for as long
65 as possible. Recommendations for treatment include gait training, strengthening, balance
66 training, energy conservation education, prescribing braces, and assistive device training. For the
67 early stage of ALS, the focus of PT is to assess fall risk and the need for adaptive equipment, as
68 well as exercise focusing on strength, range of motion (ROM) within the lower extremities (LE),
69 balance, and aerobic exercise.⁵ In middle stage ALS, PT is used for assessing the use of assistive
70 devices and wheelchairs, as well as education on transfers.⁵ Advanced stages of ALS require
71 palliative care and hospice, including caregiver education and monitoring to prevent skin break

72 down and contractures.⁵ The importance of rehabilitation is to promote independence and
73 improve quality of life as much as possible across the continuum of the disease progression.

74 Patients with ALS, as well as older patients with arthritis, are at risk for falling with a
75 decrease in strength and balance during activity.^{5,6} It was shown that balance training can
76 improve static, dynamic, proactive, and reactive balance to reduce fall risk.⁷ Balance training,
77 including use of perturbation, can improve dynamic stability and LE strengthening.⁸ Not only
78 balance training, but also core stabilization exercises have shown to help improve balance, gait,
79 and ADL's.⁹ Other case reports have also demonstrated single-task and dual-task balance training
80 being used to work on decreasing risk of falls.¹⁰ The purpose of this case report was to describe
81 balance training and reducing fall risk in a patient who had been diagnosed with ALS.

82 **Patient History and Systems Review**

83 The patient gave written consent for this case report to participate in a program working on
84 balance deficits to decrease her high fall risk along with her plan of care. She was a pleasant 82-
85 year-old female who began physical therapy (PT) one year prior to the episode of care (EOC)
86 documented in this case report, with the diagnosis of ALS who presented with bulbar onset
87 (ALS). Over the next winter, the patient went to Florida where she received PT services at home
88 twice a week. One year after her initial diagnosis, she returned to the clinic with a referral by her
89 primary care physician (PCP) which consisted of the diagnosis of ALS, decreased functional
90 mobility, high fall risk, and left hip/knee pain due to osteoarthritis.

91 The patient's primary complaint was weakness in the LE, especially in the left hip secondary
92 to osteoarthritis. Her goal for PT was to maintain her strength and balance to preserve functional
93 mobility and independence. She was very open to physical therapy care and represented strong
94 will and hard work. Because of the disease progression, her treatment required a team approach
95 which included other services such as Occupational Therapy (OT) and Speech Therapy (SLP).

96 Previous PT treatment focused on improving walking tolerance, gait, balance, and functional
97 strengthening with stairs and squatting.

98 Challenges that the patient faced included stairs, (static/dynamic/sitting/standing) balance,
99 dysarthria, dropping things, and dysphagia. Her husband assisted her at home with cooking and
100 driving. At the time of the initial evaluation, the patient was independent with bed mobility,
101 toileting, showering, and laundry. The patient ambulated with a rollator and was able to tolerate
102 walking within the community. Her past medical history included an initial onset of symptoms
103 with slurred speech and weakness when she was first diagnosed with ALS, as well as
104 osteoarthritis in her left hip. She was a very pleasant and resilient person who worked hard to
105 maintain her function and independence for as long as possible. See Table 1 for Systems Review
106 results.

107 **Examination – Tests and Measures**

108 The patient presented to the clinic with muscle weakness and balance deficits due to her
109 diagnosis of ALS and left hip/knee osteoarthritis. Please see results of tests and measures in
110 Table 2-3. Manual Muscle Testing (MMT) was used to determine the strength of her LE muscle
111 groups into hip flexion, abduction, adduction, extension, knee flexion and extension, and ankle
112 dorsiflexion as described by Youdas, et al.¹¹ MMT is reported to have excellent test- retest
113 reliability, as well as a specificity of 0.90 and sensitivity of 0.35 for patients with hip
114 osteoarthritis. MMT revealed weakness in bilateral LE.

115 Multiple measures were used to assess her fall risk. The first measure used was the Berg
116 Balance Scale (BBS). The BBS uses functional items with a rating where the greater rating of
117 four points per item indicates good balance.¹² This tool was found to have high reliability, with
118 an interrater reliability of 0.97 and intrarater reliability of 0.98.¹² The BBS is reported to have a
119 sensitivity of 91% and a specificity of 82% and with a score of less than 42 being predictive of

120 falls.¹³ The patient's score on the BBS was 37/56 which put her at a risk of falling.

121 The Timed Up and Go (TUG) test, which consists of standing, walking three meters, and
122 returning to the chair to sit, was also used.¹⁴ The TUG shows a specificity of 87% and sensitivity
123 of 87% in determining fall risk of older adults.¹⁵ The cut off score for this test is less than 14
124 seconds (s) to complete the test indicated a high fall risk.¹⁵ According to a study by Steffen,
125 Hacker, and Mollinger, the TUG has high interrater and intrarater reliability with testing.¹⁴ The
126 patient was able to complete the TUG in 23.71s, indicating a high fall risk.

127 The 6 Minute Walk Test (6MWT) was used to aerobic capacity and endurance by
128 measuring the distance walked over six minutes.¹⁶ The 6MWT was proven to have good test-
129 retest reliability.¹⁵ Due to respiratory problems that arise with progression of ALS, the 6MWT
130 was done to monitor respiratory endurance with activity.¹⁶ Before the test was performed, the
131 patient had a peripheral capillary oxygen saturation (SpO₂) of 91% and a heart rate of 68 beats
132 per minute (bpm). After walking 128.016 meters (m) for 6 minutes (min), the patient had an
133 SpO₂ of 92% and increased heart rate of 90 bpm.

134 Due to her reports pain in her left hip, the Numeric Pain Rating Scale (NPRS) was used
135 with a range of 0 (no pain) to 10 (the worst pain).¹⁷ The NPRS was proven to have excellent test-
136 retest reliability and excellent internal consistency.¹⁷ She reported her worst pain as a 4/10 on the
137 NPRS. The patient's ROM for bilateral LE was within functional limits when grossly assessed.
138 Other observations, such as gait and postural assessment, were made during the initial evaluation
139 to determine treatment for functional strengthening and balance exercises. The patient used a
140 rollator as an assistive device and her gait mechanics presented with a Trendelenburg sign due to
141 right gluteus medius weakness, hyperextension in the knee, genu varus, foot slap, and foot
142 eversion on the left. She was able to stand on her right LE for a single limb stance with bilateral
143 upper extremity support for three seconds, but was unable to stand on her left. She could tolerate

144 standing 45 seconds with eyes closed, feet together, and without upper extremity support. She
145 was also able to stand for two minutes unsupported with eyes open with supervision.

146 **Clinical Impression: Evaluation, Diagnosis, Prognosis**

147 Drawing conclusions from the examination, the patient showed decreased muscle
148 strength in the bilateral LE, balance deficits, and impaired ambulation and stairs. Given these
149 deficits, she was appropriate for PT for strengthening, balance training, and improving functional
150 mobility. The patient's medical diagnosis was ALS and her PT diagnoses were high fall risk,
151 decreased functional mobility, and left hip/knee pain.

152 Due to the disease progression of ALS being fatal, there was a poor medical prognosis;
153 however, PT was focused on the goal of maintaining current function with strengthening and
154 decreasing the patient's fall risk from loss of balance. Education was provided to the patient and
155 caregiver regarding the disease progression and the role of PT. Research showed that the
156 progression of ALS can cause respiratory problems that lead to death three-five years after a
157 person was diagnosed.⁵ The need for PT with this disease was to help promote and maintain
158 respiratory/cardiopulmonary health through exercise for as long as possible, as well as functional
159 mobility and strength.

160 Along with PT, the patient was also referred for other rehabilitation services. SLP
161 worked on oral motor weakness and problems with dysarthria, and OT worked on energy
162 conservation techniques, grip strength, manual dexterity, and upper extremity active ROM. The
163 patient was evaluated at the initial evaluation in this EOC and at the final follow up after 12
164 weeks. The focus of this case report was the balance training component used to decrease the
165 patient's high fall risk which included static, dynamic, proactive, anticipatory, and reactive
166 balance training with functional activity. She was seen one to two times weekly and was given a
167 home exercise program (HEP) to continue as tolerated so long as she was not overly fatigued.

168 She also performed strengthening exercises to address those deficits for maintenance of
169 functional mobility. See Table 4 for the patient's goals.

170 **Intervention and Plan of Care**

171 The patient received PT services 1-2 times weekly, and OT/SLP services once a week. PT
172 and OT were in regular communication about the patient's progress and how she was able to
173 tolerate each session. The patient went to the rehab clinic for OT services with PT afterward, in
174 the same visit, and followed up with an additional PT session later on in the week. A home
175 evaluation was done with input from rehab to make suggestions to decrease her fall risk. These
176 recommendations were motion-sensor lighting, cordless phones/cellphone, durable medical
177 equipment (raised toilet seat/shower chair), shoes with slip resistant soles, grab bars within the
178 shower and toilet area, and non-skid strips on the step going into her home.

179 Documentation was done on CPSI ClientWare (Mobile, AL) software. Daily notes were
180 written each session to monitor progress, exercises performed, and it included an assessment on
181 how the patient was able to tolerate exercise as well as explaining PT intervention. Every tenth
182 session, a re-evaluation was completed and sent to her PCP.

183 She reported not following her home exercise program regularly due to fatigue and time
184 constraints. She was very compliant in attending PT sessions and only missed one session due to
185 fatigue. For treatment session ten, exercises and repetitions were scaled back due to her reports
186 of increased tiredness, as well as an observed slower pace and difficulty with performing
187 exercise. The patient's exercise program was progressed based on her tolerance for activity
188 during each session.

189 With PT's main focus being on strengthening and balance training, a gait belt was used and
190 exercises were performed in parallel bars for safety and close guarding. To decrease the patient's
191 fall risk, balance training incorporated different types of balance control including steady-state,

192 proactive/anticipatory, and reactive. Evidence has shown that balance training is recommended
193 to reduce fall risk in older adults.⁷ This intervention was used for postural alignment and control,
194 adaption to different tasks and environments, the use of multiple sensory systems to maintain
195 balance, and improve safety when the patient was at risk of falling.¹⁸ Please see Table 5-6 for
196 interventions.

197 *Static balance control* was defined by O’Sullivan, Schmitz, and Fulk as “the ability to
198 maintain stability and orientation with the center of mass over the base of support with the body
199 at rest.”^{18 (pp275)} This was practiced in standing to promote standing endurance and balance with
200 activities with a narrower and functional base of support. Static challenges also included standing
201 with a narrow base of support and with eyes closed to decrease sensory input and without upper
202 extremity support in the parallel bars.¹⁷ The patient used the mirror when her eyes were open to
203 maintain correct posture during exercises.

204 *Dynamic/proactive postural control* is referred to as maintaining the center of mass within
205 the base of support and not fall outside of the limits of stability while moving the body.¹⁸ Both
206 seated and standing balance exercises were done to allow the patient to rest as to control her
207 fatigue throughout the session. During this type of balance training, the patient was told what the
208 activity was so she could initiate proper postural control in order to perform the action.¹⁶ She
209 required some support of her upper extremities to perform transfers, as well as using the parallel
210 bars during exercises that required her to stand on a single limb, with a mirror being used for
211 postural cueing.

212 *Reactive balance* is used as a reactive strategy to an unsuspected perturbation that results in
213 compensatory motion at the hip, ankle, and stepping.¹⁸ We focused on improving reactive
214 balance strategies, as they are important when an unsuspecting perturbation may cause a fall.⁸

215 Perturbations were used in the patient’s plan of care, without upper extremity support, to
216 challenge reactive balance and train her LE muscles to respond.

217 The patient’s program began with strengthening exercises that would also challenge static
218 and dynamic balance. She was educated on a home exercise program that consisted of: standing
219 with eyes open and feet together, balancing without upper extremity support 4x15 seconds; toe
220 taps on step alternating 2x10 repetitions; heel raise to toe lift 2x10 repetitions; and reaching at
221 her counter for a cup and placing it back in the same spot while standing for 2x10 repetitions.
222 Due to fatigue that occurs with the disease progression, she was instructed to perform the
223 exercises separately throughout the day and to avoid doing exercises on days of increased fatigue
224 to save energy for daily activities.

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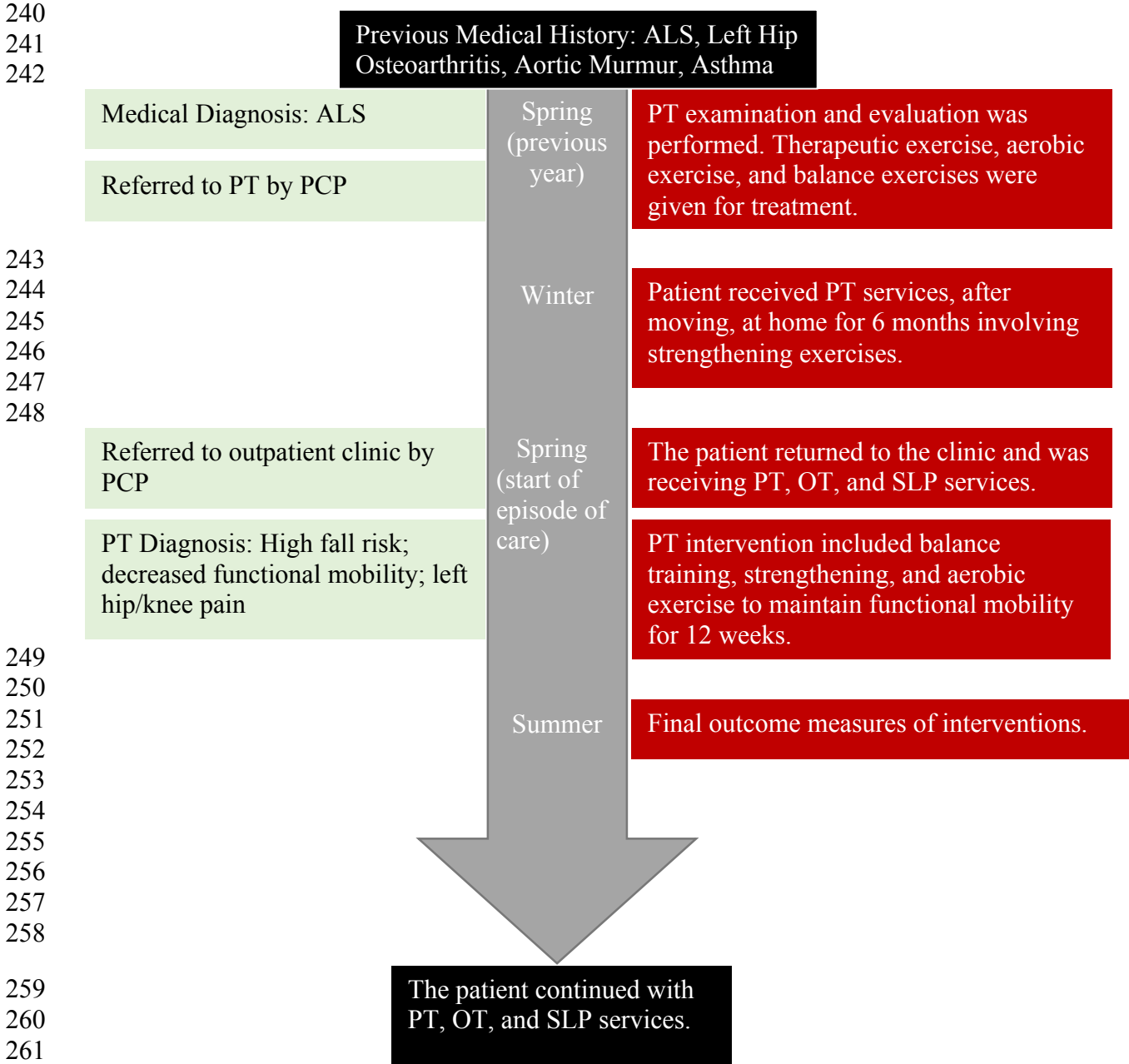
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239 **TIMELINE**



269 **OUTCOMES**

270 The patient received 13 PT sessions over 12 weeks. Balance training was utilized
271 throughout the sessions to decrease fall risk, as well as therapeutic exercise to maintain
272 strength for ADL's. The patient performed aerobic exercise at each session to maintain
273 cardiopulmonary health and to increase LE strengthening. The patient was assessed at the
274 beginning of care and after 12 weeks of the interventions. Throughout treatment, she
275 demonstrated slight decline in function, but was able to maintain function within the minimal
276 clinically important difference (MCID). Maintenance of function was shown by the 6MWT
277 (120 m to 126 m) where distance was still within the MCID, and the TUG (23.75 s to 29 s)
278 showed that she was independent in transfers.^{25,26} Only slight decrease in strength was shown
279 in left dorsiflexion (4 to 3+/5) and in balance on the BBS (37 to 29/56). See Table 2-3 for
280 final follow up results.

281 As mentioned previously in the interventions, the patient was very compliant with
282 attending PT sessions, however, fatigue was a barrier to exercise prescription. See Table 5-6
283 to see exercise progressions. Intervention tolerance was monitored subjectively throughout
284 the sessions and followed up with at the next session to assess how the patient felt after the
285 previous appointment. There were no adverse events during this EOC.

286 **DISCUSSION**

287 In this case report, balance training and therapeutic exercise demonstrated the potential
288 for maintaining function in a patient on palliative care. This patient presented between early to
289 middle stage ALS. Over the course of treatment, as documented in previous literature, fall risk
290 assessment was performed and the exercise program focused on strength, balance, and aerobic
291 exercise.⁵ Recommendations were given to decrease fall risk in the home and the patient was
292 educated on sit to stand transfers. Although her balance did not improve according to the BBS

293 and TUG, the patient did not report any falls during this EOC. She maintained the majority of
294 her strength as measured by MMT, as well as cardiovascular function in the 6MWT over the 12
295 weeks.

296 Because of the progression of the disease, one strong component in this EOC was
297 education to help maintain mobility. She was educated on safety in the community, as well as in
298 her activities at home to help decrease her risk of falling. This, along with her exercises, are ways
299 that PT can provide care to those with ALS. Limitations to this intervention included the
300 decrease in activity tolerance and increase in fatigue. The balance of activity tolerance and
301 fatigability was difficult to maintain in prescribing exercises to improve functional mobility. This
302 case report describes only a small window of time for the interventions, not allowing long term
303 results to be seen in her outcomes. Within the 13 sessions, the patient was able to meet some of
304 her goals including maintaining balance in sitting or standing for two minutes (min) unsupported,
305 denying an increase in pain greater than 4/10, and maintaining her LE ROM within functional
306 limits.

307 Research is needed to find the best interventions for maintaining functional mobility and
308 balance in patients with ALS, as well as dosage recommendations. In 2018, The American
309 Physical Therapy Association (APTA) House of Delegates approved motion 46-18 *Charge:*
310 *Eliminating the Improvement Standard for Receiving Physical Therapy*, which supports PT
311 services for hospice and palliative care in the maintenance of function.⁹ This public policy charge
312 to the APTA has the potential to allow future practitioners to help patients, such as this, with
313 support for reimbursement of care due to degenerative diseases. Functional decline in the
314 presence of a progressive neurodegenerative disorder was anticipated; however, treatment was
315 primarily focused on maintaining functional mobility and decreasing fall risk. This case
316 illustrates how PT services can be utilized by continuing to promote functional independence

317 with terminal diseases.

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390 **TABLES and FIGURES (Max of six total)**

391 **Table 1. Systems Review**

Systems Review	
Cardiovascular/Pulmonary	The patient has previous history of an aortic murmur and asthma.
Musculoskeletal	Dupuytren’s Disease both hands, Lumbar vertebrae 3-5 spinal stenosis, left hip arthritis
Neuromuscular	ALS resulting in bilateral LE and UE weakness, and dysarthria.
Integumentary	The patient denied sensation alterations and integumentary system is intact.
Communication	The patient presents with dysarthria due to bulbar symptoms from the ALS. When communication is difficult, she uses a tablet to write down her responses.
Affect, Cognition, Language, Learning Style	She is a pleasant female who shows resilience and is determined to maintain current function for as long as possible. Her learning style consists of visual, auditory, and hands on. She was alert and oriented to person, place, time, and situation. The patient communicates in English.
Medications	Albuterol: Bronchodilator ¹⁹ ; Singulair: Asthma ²⁰ ; Pravastatin: Hypercholesterolemia ²² ; Synthroid: Hypothyroidism ²³

392 Table 1. LE= lower extremity; UE= upper extremity

393 **Table 2. Tests & Measures**

Tests & Measures	Initial Evaluation Results			Final Follow Up Results		
		Pre-Test	Post –Test		Pre-Test	Post-Test
TUG	23.75 s			29 s		
Berg Balance	37/56			29/56		
6 Minute Walk Test (6MWT)	420 feet =128.02 meters			412 feet =125.58 meters		
	Oxygen Saturation	91%	92%	Oxygen Saturation	93%	94%
	Heart Rate	68 bpm	90 bpm	Oxygen Saturation	78 bpm	98 bpm

394 Table 2. s= seconds; bpm= beats per minute

395 **Table 3. Lower Extremity Strength Testing**

	Left		Right	
	Initial Evaluation	Final Follow Up	Initial Evaluation	Final Follow Up
Hip Flexion	4-/5	4-/5	4/5	4/5
Hip Abduction	5/5	5/5	5/5	5/5
Hip Adduction	5/5	5/5	5/5	5/5

Knee Flexion	4/5	4/5	4+/5	4+/5
Knee Extension	4/5	4/5	4+/5	4+/5
Dorsiflexion	4-/5	3+/5	4+/5	4+/5

396 Table 3. MMT is measured on scale from 0-5, where 0 is no trace of muscle contraction and 5 is
 397 normal.²⁴ As measured from this data, 4-/5 showed that the patient was able to hold the position
 398 while the tester gave slight to moderate force with testing, 4/5 is against a moderate force, and a
 399 4+/5 is against a strong force.²⁴

400
 401 **Table 4. Physical Therapy Goals**

Short Term Goals	Long Term Goals
The patient will be independent and compliant with a home exercise program outside of the clinic to assist with strength, gait, and mobility in 10 visits. Goal Not Met	Patient will present with ambulation distance of at least 420 feet signifying no regression in gait tolerance in 20 visits. Goal Met
The patient will maintain her Berg Balance score to signify maintaining function with gait and activities of daily living in 10 visits. Goal Not Met	The patient will increase Berg Balance Test by an additional 1-2 points signifying less fall risk in 20 visits. Goal Not Met
The patient will deny an increase in pain higher than 4/10 as to not increase pain with therapy in 10 visits. Goal Met	The patient will be able to maintain her lower extremity range of motion within functional limits to allow ease with activities of daily living and ambulation in 20 visits. Goal Met
The patient will decrease her Timed Up and Go score from 23.75 seconds to 20 seconds to show a decrease in her fall risk in 10 visits. Goal Not Met	The patient will be able to maintain balance with standing and sitting unsupported for 2 min to decrease fall risk with reaching for objects in 20 visits. Goal Met

402

403 **Table 5. Interventions (Sessions 1-8)**

	Session	1	2	3	4	5	6	7	8
Aerobic Exercise	Nu Step (Ann Arbor, MI)	10 min	10 min	10 min	10 min	10 min	10 min	10min	10 min
Static Steady State Balance									
	Eyes Open Feet Together Unsupported						3x 20 s		
	Eyes Closed Feet Apart Unsupported						3x 15 s	3x 15 s	
Proactive /Dynamic Balance									
	Sit to Stand	2x5 reps	2x5 reps	2x5 reps	3x5 reps	3x5 reps	3x5 reps	3x5 reps	3x5 reps
	Seated March	2x 10 reps	2x10 reps	2x10 reps				2x15 reps	
	Mini Squat		2x10 reps	2x10 reps	3x10 reps	3x10 reps			

	Standing Hip Abduction		2x10 reps	2x10 reps	2x10 reps	2x10 reps			
	Standing Hip Extension			2x10 reps	2x10 reps	2x10 reps			
	Calf Raise	2x10 reps	3x10 reps	3x10 reps	3x10 reps	3x10 reps			3x10 reps
	Standing Knee Flexion			2x5 Bilateral reps					
	Seated Knee Flexion				2x10 reps				
	Step Taps Bilaterally						4" 3x10 reps	6" 10x	
	Standing Reach Bilaterally						2x10 reps		
	Standing Marches								3x10 reps
	Step Ups								6" 10x
	Reactive Balance								
	Calf Raise to Toe Lift						2x10 reps	2x10 reps	
	Eyes Open Feet Together Perturbation							3x15 s	

404 Table 5. reps= repetitions; s= seconds

405 **Table 6.** Interventions (continued) Sessions 9-13

	Session	9	10	11	12	13
Aerobic Exercise	NuStep (Ann Arbor, MI)	10 min	10 min	10 min	10 min	10 min
Static Steady State Balance						
	Eyes Open Feet Together Unsupported	2 min				
	Seated Eyes Open	2 min				
	Eyes Closed Feet Together Unsupported	3x 20 s	4x 20 s	3x 35 s	3x 45 s	3x 45 s
Proactive /Dynamic Balance						
	Sit to Stand	3x5 reps	2x5 reps	2x5 reps	3x5 reps	3x5 reps
	Seated March		3x10 reps			2x10 reps
	Calf Raise		3x10 reps		2x10 reps	2x10 reps
	Standing Reach Bilaterally		15x Bilateral		15x Bilateral	15x Bilateral
	Standing Marches			2x10 reps		

	Single Limb Stance/Kick		12x Bilateral			
	Narrow Walk		4x30 steps			
	Tandem walking			35 steps	40 steps	40 steps
Reactive Balance						
	Eyes Open Feet Together Perturbation		3x 15 s	3x 20 s	3x 20 s	

406 Table 6. min=minutes; reps= repetitions; s= seconds

407 **CARE Checklist**

CARE Content Area	Page
1. Title – The area of focus and “case report” should appear in the title	1
2. Key Words – Two to five key words that identify topics in this case report	1
3. Abstract – (structure or unstructured) a. Introduction – What is unique and why is it important? b. The patient’s main concerns and important clinical findings. c. The main diagnoses, interventions, and outcomes. d. Conclusion—What are one or more “take-away” lessons?	2
4. Introduction – Briefly summarize why this case is unique with medical literature references.	2-4
5. Patient Information a. De-identified demographic and other patient information. b. Main concerns and symptoms of the patient. c. Medical, family, and psychosocial history including genetic information. d. Relevant past interventions and their outcomes.	4-5
6. Clinical Findings – Relevant physical examination (PE) and other clinical findings	5-8
7. Timeline – Relevant data from this episode of care organized as a timeline (figure or table).	11
8. Diagnostic Assessment a. Diagnostic methods (PE, laboratory testing, imaging, surveys). b. Diagnostic challenges. c. Diagnostic reasoning including differential diagnosis. d. Prognostic characteristics when applicable.	7-8
9. Therapeutic Intervention a. Types of intervention (pharmacologic, surgical, preventive). b. Administration of intervention (dosage, strength, duration). c. Changes in the interventions with explanations.	8-10
10. Follow-up and Outcomes a. Clinician and patient-assessed outcomes when appropriate. b. Important follow-up diagnostic and other test results. c. Intervention adherence and tolerability (how was this assessed)?	12

408

d. Adverse and unanticipated events.	
11. Discussion a. Strengths and limitations in your approach to this case. b. Discussion of the relevant medical literature. c. The rationale for your conclusions. d. The primary “take-away” lessons from this case report.	12
12. Patient Perspective – The patient can share their perspective on their case.	4-5
13. Informed Consent – The patient should give informed consent.	4

409