

St. Catherine University

SOPHIA

Doctor of Physical Therapy Research Papers

Physical Therapy

6-2013

Physical Therapy Interventions and Outcomes for a Patient Following Hospitalization for Viral Gastroenteritis and Resulting Hospital-Acquired Pneumonia: A Case Report

Rachel Lewis
St. Catherine University

Follow this and additional works at: https://sophia.stkate.edu/dpt_papers

Recommended Citation

Lewis, Rachel. (2013). Physical Therapy Interventions and Outcomes for a Patient Following Hospitalization for Viral Gastroenteritis and Resulting Hospital-Acquired Pneumonia: A Case Report. Retrieved from Sophia, the St. Catherine University repository website: https://sophia.stkate.edu/dpt_papers/29

This Research Project is brought to you for free and open access by the Physical Therapy at SOPHIA. It has been accepted for inclusion in Doctor of Physical Therapy Research Papers by an authorized administrator of SOPHIA. For more information, please contact amshaw@stkate.edu.

PHYSICAL THERAPY INTERVENTIONS AND OUTCOMES FOR A PATIENT
FOLLOWING HOSPITALIZATION FOR VIRAL GASTROENTERITIS AND
RESULTING HOSPITAL-ACQUIRED PNEUMONIA: A CASE REPORT

by

Rachel Lewis, SPT

Doctor of Physical Therapy Program
St. Catherine University

June 7, 2013

Research Advisor: Associate Professor John S. Schmitt, PT, PhD

Abstract:

Background and Purpose: Gastroenteritis is an inflammation of the gastrointestinal tract, including the stomach and the intestines, and is a major cause of illness in the United States. It is a significant cause of hospitalization and deaths every year, especially in the elderly population. The purpose of this case report was to describe the interventions and outcomes of a patient undergoing physical therapy after hospitalization for viral gastroenteritis using the International Classification of Functioning, Disability and Health as the theoretical framework.

Case Description: The patient was an 88 year old female who was admitted to a skilled nursing facility (SNF) into their transitional care unit after a four day hospital stay due to viral gastroenteritis. She also was diagnosed with pneumonia on her third day in the SNF. The patient spent 51 days in the SNF and participated in 40 physical therapy sessions. Physical therapy interventions included lower extremity strengthening, postural training, gait training, balance training, aerobic endurance training while monitoring and weaning the patient off of supplemental oxygen.

Outcomes: The patient was completely independent with all mobility and walked on a daily basis prior to being hospitalized. At baseline at the SNF, the patient

was able to stand for two minutes with upper extremity support and minimal assistance, with oxygen desaturation requiring supplemental oxygen. The patient progressed to complete independence with bed mobility, modified independence with transfers and ambulation up to 910 feet with a rolling walker. Balance test scores included a Tinetti balance score of 24/28 and a Berg Balance Scale score of 42/56. The patient also made gains in functional mobility but did not reach all of her physical therapy goals prior to discharge.

Discussion: This case report describes the interventions and outcomes for a patient after hospitalization from viral gastroenteritis and resulting hospital-acquired pneumonia. The interventions described appeared to assist in the patient's progress towards her prior level of function. Additional research is warranted to establish treatment effects in larger populations.

The undersigned certify that he has read, and recommended approval of the research project entitled...

PHYSICAL THERAPY INTERVENTIONS AND OUTCOMES FOR A PATIENT
FOLLOWING HOSPITALIZATION FOR VIRAL GASTROENTERITIS AND
RESULTING HOSPITAL-ACQUIRED PNEUMONIA: A CASE REPORT

submitted by

Rachel Lewis

in partial fulfillment of the requirements for the Doctor of Physical Therapy
Program

Primary Advisor

A handwritten signature in black ink, appearing to read "John Schmidt". The signature is written in a cursive style with a large initial "J".

Date: June 12, 2013

Table of Contents:

Abstract	i
Approval	iii
Chapter I: Introduction	1
Chapter II: Case Description	4
Chapter III: Outcomes	16
Chapter IV: Discussion	20
References	23

Chapter I: Introduction

The International Classification of Functioning, Disability and Health (ICF) model was developed to provide a standard language and framework for describing human functioning and disability.¹ It was developed by the World Health Organization in 2001 and endorsed by the American Physical Therapy Association in 2008.^{1,2} The ICF model focuses on how people function in their daily life instead of focusing on their diagnosis or the presence or absence of disease.² This framework is helpful to use when evaluating or treating a patient in physical therapy in order to take a holistic and comprehensive approach to how a patient functions.

The ICF framework consists of two sections. The first section includes functioning and disability. This section can be broken down into three specific components. First, body functions and structures describe anatomical and physiological aspects of the human body. The second component includes activities, which are the tasks and actions specific to that individual. The third component is participation, which includes their involvement in life situations or roles.³

The second section of the ICF includes two contextual factors. First, environmental factors are aspects that are outside of a person's control, such as family, work, home environment, and cultural beliefs. The second contextual factor includes personal issues. Race, gender, age, educational level, coping

styles, motivation, etc. are important personal factors because even though they are independent from a health condition, they have an impact on how a person functions.³ This case report uses the ICF as a theoretical framework when providing physical therapy services with a patient in a rehabilitation setting after being hospitalized with gastroenteritis.

Gastroenteritis is an inflammation of the gastrointestinal tract, including the stomach and the intestines, and is a major cause of illness in the United States.⁴ The inflammation is most commonly caused by an infection from a virus, but it may also be from bacteria, toxins, parasites, or an adverse reaction to something in the diet or medication.⁵ Rotavirus, norovirus, adenovirus and astrovirus are the four most common causes of viral gastroenteritis.⁶ In adults, the Norovirus causes ninety percent of gastroenteritis cases in the United States.⁶ Every year, approximately twenty-one million cases of gastroenteritis are caused by the Norovirus; it is the cause of over fifty-six thousand hospitalizations and five hundred and seventy deaths.⁷

The most common symptoms of viral gastroenteritis are watery diarrhea and emesis.⁴ Headache, fever and abdominal cramps may also be present.⁴ Symptoms start between twelve and seventy-two hours after being infected with a virus, and typically resolve between one to ten days depending on which virus caused the illness.^{4,8} The most common complication from gastroenteritis is dehydration.⁹ Without adequate rehydration, the body is unable to maintain the

proper balance of electrolytes.⁹ Dehydration may cause serious health issues such as organ damage, shock, or coma.⁹

The majority of people who get viral gastroenteritis recover without any residual complications, unless they become dehydrated.⁹ Hospitalizations and deaths occur more frequently in elderly people, especially those who live in geriatric nursing homes.¹⁰ There are many contributing factors that make the elderly more vulnerable to viral gastroenteritis. Older adults have a physiological decrease in gastric acid secretion, decreased motility in the gastrointestinal tract and a reduced immunity response.^{11,12}

A detailed search of the literature returned no articles that describe the evaluation and physical therapy interventions in a patient with viral gastroenteritis. The purpose of this case report was to describe the interventions and outcomes of a patient undergoing physical therapy after hospitalization for viral gastroenteritis using the ICF model as the theoretical framework.

Chapter II: Case Description

The patient was an 88 year old female who was admitted to a skilled nursing facility (SNF) into their transitional care unit after a four day hospital stay. The patient was hospitalized due to persistent nausea, vomiting, diarrhea and significant weakness. The hospital diagnosis included viral gastroenteritis and a viral UTI. Her past medical history included glaucoma, syncope, bradycardia, a pacemaker implant in 2011, lumbar spinal stenosis, osteoarthritis and borderline hypercholesterolemia. Her current medications included acetaminophen, benzonatate, betaxolol, dorzolamide, Mucinex, Apresoline, Narcan, Zofran, Cepastat and Compazine.

The patient was previously independent with all functional mobility prior to her hospitalization. She did not require any supplemental oxygen at rest or during activity. The patient performed daily upper and lower body stretches in the mornings and walked daily at her local mall for a minimum of 30 minutes. She also did abdominal stabilization exercises and low back stretches a few times per week. She received these exercises from her previous physical therapy for low back pain approximately three years ago. The patient owned a cane that she used for two months when she was having back pain.

The patient lived with her husband who was 91 years old. The patient reported that he was in good health and used a rolling walker for mobility. However, he would not be able to assist the patient with any mobility if needed

upon discharge due to muscle weakness and poor balance. The patient had twelve stairs to go down into the basement, where the washer and dryer are located. There were no stairs to enter her home and the bed and bathroom were on the main floor.

A physical therapy order was requested on the day that she was admitted into the SNF. On the second day of the patient's stay in the SNF, an examination was performed by a physical therapist. A review of systems was conducted to identify areas for further testing. The cardiopulmonary, integumentary, neuromuscular and musculoskeletal systems were screened. The patient's blood pressure, heart rate and respiratory rate were all within normal limits. The patient's oxygen saturation on room air at rest ranged between 92-94%. The patient had mild edema in her bilateral lower extremities below the knees. The patient had normal skin integrity and color, and no wounds on her body. The patient demonstrated impaired sitting balance at the edge of the bed and required assistance to prevent a loss of balance. The patient demonstrated good coordination in upper and lower extremities. Her gross upper and lower extremity range of motion was within functional limits, but upper and lower extremity strength was decreased. The patient demonstrated gross symmetry in the appearance of her upper and lower extremities.

Clinical Impression

The patient appeared to be a good candidate for this case report and appropriate for physical therapy intervention. The patient demonstrated lower

extremity weakness, impaired balance and required increased assistance for mobility. The patient was independent prior to hospitalization and motivated to participate in physical therapy in order to return to her prior level of function. The plan for the physical therapy examination included additional tests and measures in the areas from the impaired systems review. The patient was also examined by an occupational therapist, therefore, the upper extremities were not tested in the physical therapy examination.

Examination

The patient demonstrated lower extremity weakness in the systems review; therefore manual muscle testing was conducted. Manual muscle testing positions and grades are consistent with those described by Reese in 2005.¹³ Bilateral knee flexion and ankle dorsiflexion were 4 out of 5, and bilateral hip flexion and hip abduction were 3+ out of 5.

The patient required assistance with all mobility for safety. She required minimal assistance for rolling to both sides. The patient needed minimal assistance to transfer from supine to sitting with the head of the bed elevated to approximately 30 degrees, with use of the bed rail and minimal assistance for her lower extremities. She required minimal assistance for transferring from sitting to supine. Moderate assistance was required for transferring from sit to stand with verbal and tactile cues for scooting to the edge of the bed and forward weight shifting. The patient required minimal assistance for transferring from standing to sitting. She needed moderate assistance for repositioning in bed.

The patient was able to perform static sitting at the edge of the bed with minimal assistance at her shoulders to maintain her balance. The patient was able to stand with minimal assistance for balance for two minutes with poor posture. The patient had protracted shoulders, cervical neck flexion and downward gaze in sitting at the edge of the bed and in standing. After one minute of standing, the patient demonstrated a more labored breathing pattern and reported feeling light headed. Her oxygen saturation was measured using an oximeter and had dropped to 86%. The patient was instructed to sit at the edge of the bed and perform pursed lip breathing, but her oxygen levels remained between 87-89% for the second minute. The registered nurse was notified to bring supplemental oxygen in order to increase saturation above 90%. The patient received supplemental oxygen via a nasal cannula at 2L for two minutes while her oxygen saturation remained around 90%. Her oxygen was increased to 3L, and her oxygen saturation returned to 93-94%. Her initial oxygen saturation at rest was 94%.

The Tinetti balance test was initiated during the physical therapy examination. The patient was unable to complete the ambulatory section due to being unable to take any steps during the examination due to fatigue and oxygen desaturation. The Tinetti test was not completed or scored at this time.

Evaluation/Diagnosis

The patient was referred to physical therapy upon arrival to the SNF due to a decline in functional mobility following a four day hospital stay. The patient

required significantly more assistance for the completion of bed mobility, transfers and ambulation secondary to lower extremity weakness and poor activity tolerance. The patient demonstrated impaired posture in standing. She reported 0/10 pain throughout the initial examination. The patient also demonstrated oxygen desaturation with minimal activity during the physical therapy examination and was put on supplemental oxygen. The physical therapy examination findings were consistent with Preferred Practice Pattern: 4B: Impaired Posture, 4C: Impaired Muscle Performance and Pattern 6B: Impaired Aerobic Capacity/Endurance Associated With Deconditioning.¹⁴

Prognosis

The patient's prognosis was determined to be good due to prior independence with all functional mobility and the patient was highly motivated to participate in physical therapy in order to return home with her husband. The patient was diagnosed with pneumonia on her third day at the SNF, the day after her physical therapy examination. Pneumonia is an infection of one or both lungs; the alveoli become inflamed and filled with fluids or pus.¹⁵ The resulting symptoms include a cough, fever, chills, and trouble breathing.¹⁵ The additional diagnosis of pneumonia was made after the initial examination, and the plan of care was modified to reflect this change in the patient's status. The patient's prognosis was less favorable after the finding of pneumonia because her participation in physical therapy was limited throughout the first week after her diagnosis.

Plan of Care

The patient was scheduled to be seen six days a week for four weeks. The patient's physical therapy goals are listed in Table 1. Goals were added and modified throughout the course of physical therapy as appropriate. The patient's anticipated discharge plan was home with her husband. The patient's progress in physical therapy was slower than expected, and an update plan of care was written after the first four weeks to continue physical therapy interventions. The patient ultimately received 40 physical therapy interventions throughout the 51 days that she was at the SNF.

Table 1. PHYSICAL THERAPY GOALS

1. In 2 weeks, the patient will safely transfer from supine to/from sitting with complete independence requiring no verbal cues in order to regain prior level of function.
2. In 2 weeks, the patient will safely transfer from sitting to/from standing with complete independence without verbal cues in order to return to prior level of function .
3. In 2 weeks, the patient will stand with an upright posture and forward gaze for five minutes without verbal or tactile cues in order to return to prior level of function including leisure activities.
4. In 4 weeks, the patient will ambulate without an assistive device safely for 300 feet with oxygen saturation above 95% and no complains of feeling lightheaded in order to return to daily walking at the mall without cardiopulmonary compromise.
5. In 4 weeks, the patient will ascend and descend 12 stairs with modified assistance using one hand rail in order to do laundry in her basement.

Interventions

Lower Extremity Strength

Lower extremity exercises were initiated to address the patient's lower extremity weakness. Improving the patient's lower extremity strength would

increase her independence with transfers and mobility. She was able to perform supine and seated exercise initially without resistance. Exercises performed included heel and toe raises, short arc quad sets, straight leg raises with minimal assistance, hip abduction and adduction, glut sets, quad sets, heel slides, seated marching and bridging. The patient was instructed to perform 2-3 sets of 10 repetitions. She was highly motivated and requested written directions to perform these activities on her own as she could tolerate throughout the day. After the patient was able to perform supine and seated exercises safely without assistance and with correct technique, she was given a handout with pictures and written cues to perform them outside of therapy.

The patient was able to progress lower extremity exercises by performing them standing with upper extremity support and stand by assist. Exercises included heel raises, marching, squats, hip abduction, knee flexion and hip extension. She performed one set of ten initially and progressed to two sets of 15 repetitions. The patient was progressed by adding half pound weights up to 2.5 pounds. The weight was increased after she was able to perform two set of 15 without muscle fatigue.

The patient also used Nautilus® weight machines during physical therapy sessions to increase her lower extremity strength. The equipment utilized included the leg press, knee extension, hip abduction and hip adduction machines. The patient was started at low weight to learn the correct technique and form. She performed two sets of 15 repetitions, with a two minute break

between sets. The patient's weight was increased by 10% if she was able to perform 2 sets of 15 with proper form and technique and did not reach muscle fatigue.

Postural Training

The patient demonstrated impaired posture upon standing during the initial physical therapy examination. She was instructed in performing scapular retraction exercises to strengthen scapular muscles and achieve an upright posture. The patient was also given verbal and tactile cues upon standing to remember to stand upright and look forward as opposed to the floor. She was given visual feedback by standing in front of a mirror during scapular retraction exercises in order to learn the correct technique of the exercise. The patient was timed on how long she was able to maintain an upright position in standing, with the goal to reach five minutes. She was also given a verbal cue to stand upright and look forward five seconds after standing if she was unable to remember to do so independently. The number of verbal cues was decreased as she was able to achieve an upright posture upon standing independently.

Gait Training

Gait training was initiated on day 3, when the patient was able to take a few steps with a rolling a rolling walker and contact guard assistance. She had increased weight bearing through her upper extremities. She demonstrated

decreased step length, poor toe off and heel strike bilaterally. The patient was initially given verbal cues to stand with an upright posture and forward gaze prior to initiating gait in order to decrease weight bearing through her upper extremities. As she was able to increase the distance of ambulation, she was given cues for increased step length and heel strike. The number of verbal cues were decreased as she was able to ambulate without gait deviations.

The patient was able to progress to ambulation without an assistive device on day 30. She ambulated with a wide base of support, decreased step length and decreased gait speed to compensate for her impaired balance without an assistive device. The patient was given a single end cane (SEC) and able to walk with reduced gait deviations. She was familiar with how to ambulate with a cane from previous experience. The decision was made to ambulate without an assisted device during physical therapy sessions in order to challenge her dynamic balance.

Balance Training

The patient was unable to sit or stand without assistance at the time of the initial physical therapy examination. Sitting balance was challenged early in physical therapy sessions by performing seated lower extremity exercises instead of supine exercises. The patient was able to progress from requiring minimal assistance in sitting, to sitting with unilateral upper extremity support, to

sitting with no upper extremity support. She was also given reaching activities for dynamic sitting balance.

The patient's standing balance at the initial physical therapy examination was poor. She was unable to stand without bilateral upper extremity support, and unable to attempt any balance challenges. The patient performed standing balance activities with upper extremity support initially. She was progressed by decreasing the amount of upper extremity support, changing her base of support, changing the surface she was standing on, and performed balance activities with eyes open and closed. If the patient was able to maintain a position for 30 seconds without assistance, the exercise was progressed by changing the aforementioned factors. She was eventually able to perform standing balance activities with upper extremity involvement. Ambulation without an assistive device with balance challenges including head turns and obstacles were used for higher level balance challenges. Additional higher level balance activities included tandem walking, retro-walking, sidestepping and ambulation on uneven surfaces.

The Tinetti balance assessment was used to monitor the patient's risk of falling as well as progress in balance and ambulation. The assessment was also utilized to identify specific areas to address during treatment sessions. The patient was also tested using the Berg Balance Scale towards the end of her length of stay to identify higher level balance activities to work on.

Aerobic Endurance Training

The patient had very poor activity tolerance at the initial physical therapy intervention. She required long seated rest breaks between exercises and any mobility. The patient began using the Nustep recumbent machine on day 10 when she was able to ambulate into the therapy gym. She was able to complete 3 minutes on level 1 which was the lowest resistance level. The patient was progressed by increasing the amount of time on the Nustep up to 10 minutes. She was also progressed by giving her a goal to reach a certain number of steps per minute. When she reached 50 steps per minute, the resistance level was increased by one level.

Oxygen Saturation Levels

The patient's oxygen levels were monitored prior, during and after physical therapy interventions. As mentioned previously, shortness of breath is one of the symptoms commonly seen in patients diagnosed with pneumonia. The alveoli are filled with fluid or pus which decreases the effectiveness of gas exchange between the alveolar sacs and capillary beds.¹⁵ This causes the patient to have decreased oxygen saturation levels in their blood and shortness of breath. She required 3 liters of supplemental oxygen during the physical therapy examination in order to increase oxygen saturation above 90% after standing activity. The patient was instructed on performing pursed lip breathing in order to increase oxygen saturation levels. She was encouraged to use the pursed lip breathing

technique with exercises and mobility. The patient was also encouraged to perform 5 to 10 repetitions on her incentive spirometer several times a day in order to encourage deep breathing and mobilize secretions.

The patient had a doctor's order to decrease the level of supplemental oxygen required during therapy sessions as she was able. Her oxygen levels were turned down by 1 liter if she was able to perform physical therapy interventions without dropping below 90%. If the patient's oxygen saturation level dropped below 90%, or she felt light headed or dizzy, she was instructed to sit down and perform pursed lip breathing exercises. The patient was closely monitored during all therapy interventions to ensure adequate oxygen saturation levels during exercises. She was able to wean off of oxygen levels completely on day 20. Oxygen saturation levels were still monitored while the patient was on room air after supplemental oxygen was discharged.

Chapter III: Outcomes

Two different balance tests were utilized to assess the patient's balance and risk for falls. The Tinetti Balance Assessment Tool is composed of 13 balance components and 9 gait components. The score ranges from 0 to 28, with a higher score indicating better balance abilities. The Tinetti Balance Assessment Tool has been shown to have excellent reliability and validity in community-dwelling adults.¹⁶

The Berg Balance Scale is composed of 14 items that are scored from 0 to 4. The maximum score on the Berg Balance Scale is 56, indicating good balance. It is considered to be the gold standard for measuring balance in adults due to its excellent reliability and validity.¹⁷ The patient performed the Berg Balance test on day 42 and scored a 41/56. She was retested the on day 51 and scored a 42/56.

The 6-Minute Walk Test was used to measure the patient's physical endurance. She was instructed to walk as fast as she could comfortably and safely. The total distance walked in six minutes was recorded. The 6-Minute Walk Test has good reliability and validity in older adults.¹⁸ The results of the patient's Tinetti scores and 6-Minute Walk distances are listed in Figures 1 and 2.

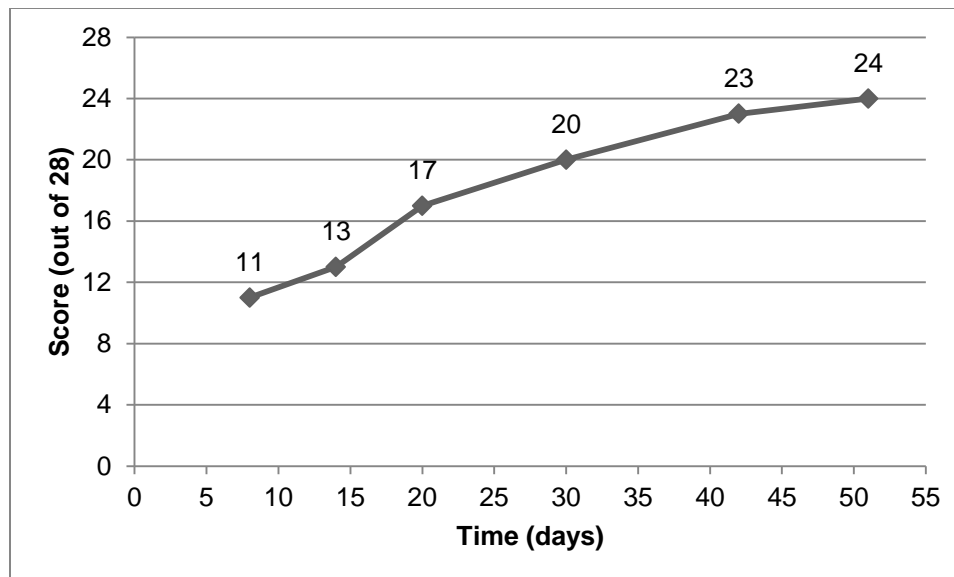


Figure 1. Tinetti Balance Assessment Tool scores

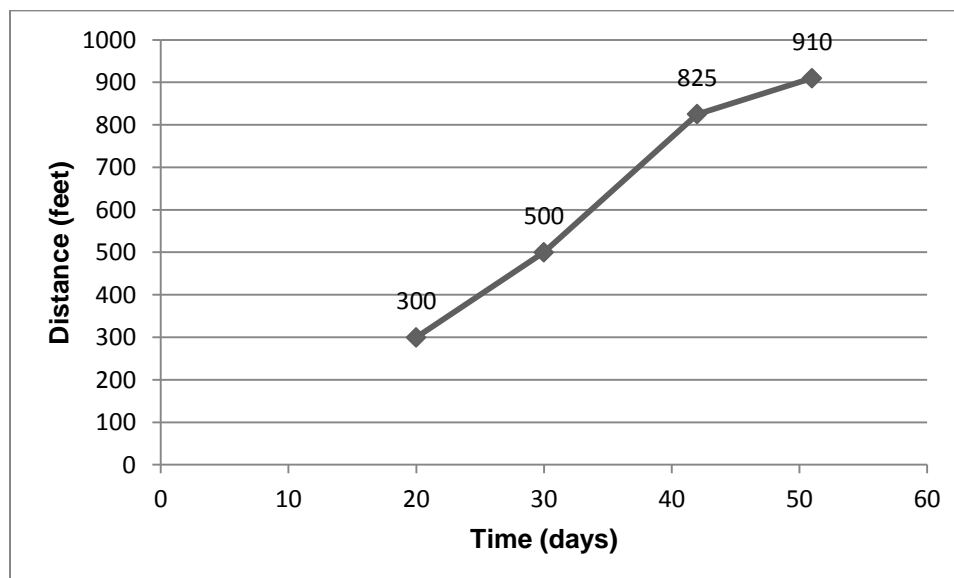


Figure 2. 6-Minute Walk distances

The patient was also able to make significant progress towards her physical therapy goals. She was able to meet two out of the five original goals and demonstrated improvements in the other three areas. The patient's progress towards her physical therapy goals are outlined in Table 2. Similar outcomes

were seen in occupational therapy. The patient was able to meet her goal of independence with upper extremity dressing. She made progress towards other her other occupational therapy goals, but still required minimal assistance for lower extremity dressing and getting into and out of a tub shower.

Table 2. PROGRESS TOWARDS PHYSICAL THERAPY GOALS

	Goal 1: Supine to/from sitting	Goal 2: Sit to/from stand	Goal 3: Upright standing posture (time)	Goal 4: Ambulate 300 feet without AD and oxygen saturation above 95%	Goal 5: Ascend/ descend 12 stairs with one handrail
Day 2 (Examination)	Min A	Mod A	unable	Unable	
Day 8	Min A	Min A	n/t	8 steps with RW, CGA, on 1L of oxygen, 93% post	
Day 14	SBA/Min A	CGA/Min A	1:50	300 feet, RW, CGA/SBA on 1 L, 98% post	
Day 20	SBA	CGA/Min A	3:00	300 feet, RW, SBA, on RA, 93% post	
Day 30	Mod I	SBA/CGA	5:00, with verbal cues	40 feet, no AD, on RA, > 95% post	
Day 42	I, goal met	Supervision	5:00, no cues, goal met	150 feet, no AD, on RA, >96%	6 stairs with one hand rail and Supervision
Day 51 (Discharge date)		Mod I		150 feet, no AD, on RA, >96%	

Abbreviations: Independent (I), Modified Independence (Mod I), Stand by assist (SBA), Contact guard assist (CGA), Minimal assistance (Min A), Moderate assistance (Mod A), not tested (n/t), assistive device (AD), room air (RA).

The patient was discharged from physical therapy and the facility after 51 days in the SNF. She returned to her home with a physical therapy home exercise program including balance and lower extremity strength exercises. The patient was also issued a rolling walker due to still demonstrating a high fall risk by a score of 42/56 on the Berg Balance Scale. She was also referred home with home health services to continue physical therapy and progress towards independent mobility as it was her prior level of function before being hospitalized.

Chapter IV: Discussion

The length of stay was significantly longer than expected in this case report. The anticipated length of stay at the initial physical therapy examination was four weeks. The patient was not discharged until day 51, in the beginning of her eighth week in the SNF. The patient was able to demonstrate progress towards physical therapy goals throughout the length of stay, but it was at a much slower progression than expected. The patient was diagnosed with pneumonia after the physical therapy examination. This type of pneumonia would be considered to be hospital-acquired pneumonia since she received her diagnosis after being hospitalized for more than 72 hours. Patients who have hospital-acquired pneumonia typically have increased hospital stays of one to two weeks.²⁰

The patient's four day hospital stay and limited mobility during the first week at the SNF was also a factor in the patient's slow progress and long length of stay. Even though she was independent with prior mobility before hospitalization, she was limited to lying in bed or sitting for short periods of time for nearly one week. The patient was also still having episodes of emesis from the viral gastroenteritis during the first 3 days of physical therapy, which contributed to minimal mobility with therapy. The negative effects of bed rest and inactivity across multiple body systems is well documented in the literature.²¹⁻²⁴

The patient demonstrated very little progress during the first week of therapy as evident by Table 2.

The ICF model was utilized during the physical therapy evaluation and selection of interventions. The impaired body structures and functions included decreased lower extremity strength, impaired posture, impaired balance, decreased oxygen saturation levels and fatigue. These impairments led to difficulties with activities including bed mobility, transfers, standing, ambulation and stairs. The patient was therefore unable to participate in her usual activities of daily living and walking at her local mall. The interventions utilized in this case report were selected to improve the impaired body structures and functions as well as activities that were identified in the initial examination. The patient demonstrated improvements in posture, balance and aerobic endurance which led to increased independence with bed mobility, transfers, standing and ambulation.

Personal factors involved in this case included the patient's high level of motivation and her independent prior level of function. These personal factors were beneficial in the course of her rehabilitation, as she was always participating in therapy in order to regain her functional independence to return to her prior roles and activities. Environmental factors in this case included the 12 stairs in the patient's home to reach the basement and the health of her husband. These factors were important when determining the patient's discharge plans. She still required assistance with mobility including stairs, and her husband was

unable to provide any assistance once returning home. The patient was deemed to be safe to discharge from physical therapy and the SNF prior to achieving her prior level of function. Therefore, the patient was discharged from the facility with a rolling walker and education regarding using the walker at all times since she was still at an increased risk of falling. Additionally, physical therapy recommendations included home health services to assist with mobility and continue to progress towards achieving her prior level of function.

This case report described the physical therapy rehabilitation of one patient after hospitalization from viral gastroenteritis with hospital-acquired pneumonia. She was able to make significant gains in functional mobility and demonstrated improved balance scores and physical endurance measures. It is important to remember that cause and effect relationships cannot be made within the context of a case report. As previously stated, there is a lack of research on the physical therapy interventions in a patient with gastroenteritis, and this is an area that would benefit from additional research. The observations from this case report may be used to guide future research in order to determine appropriate physical therapy interventions and progressions in patients with gastroenteritis and hospital-acquired pneumonia in skilled nursing facilities.

References

1. International Classification of Functioning, Disability and Health. Geneva, Switzerland: World Health Organization; 2001.
2. American Physical Therapy Association. International Classification of Functioning, Disability and Health (ICF). American Physical Therapy Association. <http://www.apta.org/ICF/>. Updated September 19, 2011. Accessed May 10, 2013.
3. American Speech-Language-Hearing Association. International Classification of Functioning, Disability and Health (ICF). American Speech-Language-Hearing Association. <http://www.asha.org/slp/icf/>. Accessed May 10, 2013.
4. Centers for Disease Control and Prevention. Viral Gastroenteritis. Centers for Disease Control and Prevention. <http://www.cdc.gov/ncidod/dvrd/revb/gastro/faq.htm>. Reviewed February 25, 2011. Accessed April 28, 2013.
5. Aranda-Michel J, Giannella RA. Acute diarrhea: a practical review. *Am J Med.* 1999;106: 670–676.
6. Eckardt AJ, Baumgart DC. Viral gastroenteritis in adults. *Recent Pat Antiinfect Drug Discov.* 2011;6(1):54–63.
7. Scallan E, Hoekstra RM, Angulo FJ, Tauxe RV, Widdowson MA, Roy SL. Foodborne illness acquired in the United States—major pathogens. *Emerg Infect Dis.* 2011;17:7–15.
8. Webber, R. *Communicable Disease Epidemiology and Control : A Global Perspective*. Wallingford, Oxfordshire: Cabi; 2009.
9. National Digestive Diseases Information Clearinghouse. Viral Gastroenteritis. National Digestive Diseases Information Clearinghouse. Accessed May 10, 2013.
10. Frenzen PD. Mortality due to gastroenteritis of unknown etiology in the United States. *J Infect Dis.* 2003;187:441–452.
11. Hunter KF, Cyr D. Pharmacotherapeutics in older adults. *J Wound Ostomy Continence Nurs.* 2006;33:630–636.
12. Shaojun S, Morike K, Klotz U. The clinical implications of ageing for rational drug therapy. *Eur J Clin Pharmacol.* 2008;64:183
13. Reese NB. *Muscle and Sensory Testing*. Saunders: Philadelphia, 2005.

14. *Guide to Physical Therapy Practice, 2nd ed.* Alexandria, Virginia: American Physical Therapy Association; 2003.
15. American Lung Association. Understanding Pneumonia. American Lung Association. <http://www.lung.org/lung-disease/pneumonia/understanding-pneumonia.html>. Accessed June 6, 2013.
16. Lin M, Hwang H, Hu M, Wu H, Wang Y, Huang F. Psychometric comparisons of the timed up and go, one-leg stand, functional reach, and Tinetti balance measures in community-dwelling older people. *J Am Geriatr Soc.* 2004;52(8):1343-1348.
17. Mackintosh S, Datson N, Fryer C. A balance screening tool for older people: reliability and validity. *Int J Ther Rehabil.* 2006;13(12):558-561.
18. Rikli R, Jones C. The reliability and validity of a 6-minute walk test as a measure of physical endurance in older adults. *J Aging Phys Act.* 1998;6(4):363-375.
19. Venditti M, Falcone M, Corrao S, Licata G, Serra P. Outcomes of patients hospitalized with community-acquired, health care-associated, and hospital-acquired pneumonia. *Ann Intern Med.* 2009;150(1):19-26.
20. Mandell GL. *Mandell's Principles and Practices of Infection Diseases.* Churchill Livingstone; 2004.
21. Harper CM, Lyles YM. The physiology and complications of bedrest. *J Am Geriatr Soc.* 1988;36(11):1047-1054.
22. Bergouignan A, Rudwill F, Simon C, Blanc S. Physical inactivity as the culprit of metabolic inflexibility: evidences from bedrest studies. *J Appl Physiol.* 2011
23. Bloomfield SA. Changes in musculoskeletal structure and function with prolonged bedrest. *Med Sci Sports Exerc.* 1997;29(2):197-206.
24. Brower RG, Consequences of bed rest. *Crit Care Med.* 2009;37(10):422-428.