



2015

Multiple Fracture following Non-Occupational Fall: A Case Report

Brittany Olson
University of North Dakota

Follow this and additional works at: <https://commons.und.edu/pt-grad>

Recommended Citation

Olson, Brittany, "Multiple Fracture following Non-Occupational Fall: A Case Report" (2015). *Physical Therapy Scholarly Projects*. 591.
<https://commons.und.edu/pt-grad/591>

This Scholarly Project is brought to you for free and open access by the Department of Physical Therapy at UND Scholarly Commons. It has been accepted for inclusion in Physical Therapy Scholarly Projects by an authorized administrator of UND Scholarly Commons. For more information, please contact zeinebyousif@library.und.edu.

MULTIPLE FRACTURE FOLLOWING NON-OCCUPATIONAL FALL: A CASE REPORT

by

Brittany Olson
Bachelor of Science in Health Science
Valley City State University, 2009

A Scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy
School of Medicine and Health Sciences

University of North Dakota

in partial fulfillment of the requirements for the degree of

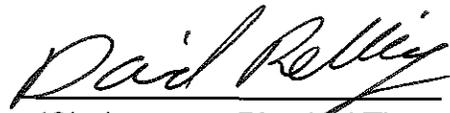
Doctor of Physical Therapy

Grand Forks, North Dakota
May, 2015

This Scholarly Project, submitted by Brittany Olson in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.



(Graduate School Advisor)



(Chairperson, Physical Therapy)

PERMISSION

Title Multiple Fracture following Non-Occupational Fall: A Case Report

Department Physical Therapy

Degree Doctor of Physical Therapy

In presenting this Scholarly Project in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the Department of Physical Therapy shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my work or, in her absence, by the Chairperson of the department. It is understood that any copying or publication or other use of this Scholarly Project or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and the University of North Dakota in any scholarly use which may be made of any material in this Scholarly Project.

Signature Brittany Olson

Date 9/5/14

TABLE OF CONTENTS

LIST OF TABLES	5
ACKNOWLEDGEMENTS.....	6
ABSTRACT	7
CHAPTER	
I. BACKGROUND AND PURPOSE.....	9
II. CASE DESCRIPTION.....	11
Examination, Evaluation and Diagnosis	12
Prognosis and Plan of Care.....	14
Intervention.....	15
Outcomes.....	17
III. DISCUSSION.....	18
Reflective Practice.....	18
REFERENCES	21

LIST OF TABLES

TABLE 1: STRENGTH ASSESSMENT 13

TABLE 2: ANTICIPATED PATIENT GOALS 14

TABLE 3: LOWER EXTREMITY EXERCISE FOR STRENGTH AND
ENDURANCE 17

ACKNOWLEDGEMENTS

I would like to thank my clinical instructor for the guidance and encouragement he provided me during the episode of care for the patient featured in this case report. I would also like to thank my advisor, Dr. Tom Mohr, for his contributions and revisions during the creation of the case report. Without the never-ending support and motivation my family gives on a daily basis, I would not be where I am today.

ABSTRACT

Background and Purpose: Falls are prevalent in adults over the age of sixty-five due to lack of balance and decreased lower extremity strength. Non-occupational falls are reported to have an increasing prevalence with age and one-fifth of these types of falls results in hospitalization. The hospitalization of patients who sustain injuries following falls most often results in skeletal fractures. The cost to treat these patients is projected to reach \$54.9 billion by the year 2020. The objective of this case report is to demonstrate the outcomes of a patient who sustained multiple fractures following a non-occupational fall.

Case Description: A sixty-five year old female presents to physical therapy within a rural Transitional Care Unit (TCU) following a twelve foot fall through her garage attic ceiling to the ground which resulted in fractures at three joints and a sprained right ankle. She received an external fixation of a left tibial fracture and open reduction internal fixation of the left thumb and right proximal humerus. An examination and evaluation revealed the patient in an immobilizer of the right upper extremity, left thumb splinted and a cast and splint on the left lower extremity. In addition to pain, the patient had weight bearing precautions which involved non-weight bearing on the left lower extremity, right upper extremity and left hand, and limitations in functional movement. A good prognosis was anticipated based on patient motivation. **Intervention:** Strength training of the lower extremity was targeted at the uninvolved joints to initially build strength that was lost over the preceding period of bed rest and then focused on endurance to return the patient to independence. Transfer training was also included. Education to the patient and spouse as well as a home exercise program were also

provided. **Outcomes:** Following a twenty-three day stay in TCU with physical therapy intervention, the patient was able to complete all sliding board transfers independently and stand with contact guard assist. She was discharged home with her husband and the necessary adaptive equipment.

Discussion: The combination of increased lower extremity strength and endurance allowed the patient to be discharged from the TCU to her home with her husband and modified independence. While the patient's response to this intervention plan was positive, the need for further research to determine the long term effects specifically to gait training exists.

CHAPTER I

BACKGROUND AND PURPOSE

Falls are considered a “significant cause of morbidity and mortality” in adults over the age of sixty-five¹. The Center for Disease Control and Prevention (CDC) reports that each year one in three adults age 65 and older falls. Of those that fall, 20% to 30% suffer moderate to severe injuries that make it hard for them to retain mobility or live independently, which increases their risk of early death¹.

According to the American College of Surgeons, non-occupational falls have increasing incidence with age and one-fifth of these falls results in hospitalization.¹ Falls increase the risk of injury and in some cases death. The number of fall-related fractures among older women are twice those for men. In adults aged 65 and older, falls account for 29% of injury deaths.¹ In 2010 falls among older adults cost the US health care system \$30 billion in direct medical costs. These costs include fees for hospital and nursing home care, doctors and other professional services, rehabilitation, community-based services, use of medical equipment, prescription drugs, changes made to the home and insurance processing.¹ According to the CDC, this cost is projected to reach \$54.9 billion by the year 2020.

Falls are often categorized based on the height from which an individual falls. One source reviewed cases on 101 falls from great heights that were treated at their trauma center in Germany.² These authors found that the most common type of fracture (83%) was in the thoracic and lumbar spine, 45% of the fractures occurred in the lower extremities and only 27% experienced head trauma. Although a small sample size was involved, a remarkable conclusion was that there was no difference in the

injury patterns after a fall from a height of seven meters (27 feet) or less than seven meters.

A "low fall" is considered to be one that occurs from twenty feet or less. There are limited sources of literature to discuss the injuries that accompany these falls.³ Helling et. al³ studied 176 patients who fell and found that a majority of the patients that experienced a low fall were younger than fifty years old and forty-seven of these falls (36%) occurred at home during household repair work from ladders, roofs, trees and through ceilings. Injuries sustained in the falls were predominately to the head and spinal cord, however thirty-two patients (14%) experienced a fracture to an extremity due to the vertical deceleration mechanism of the fall. An intensive care unit was required in ninety-two of the 176 patients.

The purpose of this case study is to present a case study of a sixty-five year old woman who suffered a non-occupational fall through her attic sheet rock twelve feet to the ground, the injuries she sustained and the physical therapy treatment she received while in a Transitional Care Unit in rural Minnesota. This is of particular interest due to the number of joints involved following the fall and the course of appropriate intervention that was selected to prepare her for the return to independence.

CHAPTER II

CASE DESCRIPTION

This case study describes the treatment a sixty-five year old Caucasian female. At the time of injury, she was semi-retired and worked as a supervisor for a local charity while living at home with her husband. They were in the process of selling their home with plans to move to their lake home near Ottertail, MN.

She was seen in physical therapy following an accident on August 5, 2013 in which she fell approximately twelve feet through her garage attic roof. She reported that the sheet rock gave way and she landed on her left ankle and right arm. She experienced immediate pain and deformity in the ankle. She did not hit her head during the fall and denied any loss of consciousness. Diagnostic imaging showed the following fractures: left tibial plafond/distal fibula, left thumb metacarpal/phalanx, and right proximal humerus. Due to fractures, she received an external fixation of the tibial fracture, and an open reduction internal fixation (ORIF) of humerus, fibula and thumb. The patient also had a right ankle sprain. She had an inpatient stay in a large hospital until 8/27/13 before being transferred to a rural Transitional care unit (TCU).

Upon her arrival to the TCU an initial musculoskeletal evaluation of this patient was completed. Prior to the accident the patient lived with her husband in a multi-level home with five steps and bilateral hand rails and was independent in transfers, and ambulation without the use of an assistive device. She was independent in self care and all activities of daily living (ADLs) and instrumental

activities of daily living (IADLs). The patient presented to PT at time of evaluation with a shoulder immobilizer on the right upper extremity, the left thumb splinted and a cast and splint on the left lower extremity. Her weight bearing precautions involved non-weight bearing on left lower extremity, right upper extremity and left hand. She is right hand dominant.

Her past medical history involved anxiety, gastroesophageal reflux disease (GERD) and a past surgical history of cholecystectomy, left ankle fracture, hysterectomy and right shoulder arthroscopy with rotator cuff repair. Her family history consisted of lung cancer in her maternal uncle. She was not a smoker and reported having one glass of wine per day (4.8 oz/week).

Examination, Evaluation and Diagnosis

At the time of examination the patient subjectively reported that her pain rating on a Visual Analog Scale was 2/10 (0= no pain, 10 = worst imaginable pain) in the shoulder, 3/10 in the left thumb and 4/10 in the left ankle.

Range of motion assessments were within normal functional limits for bilateral hip and knee movements. Range of motion of right ankle dorsiflexion was also within functional limits. Other left lower extremity movements were not assessed due to splinting. Strength testing followed and was performed in a seated position. Table 1 shows results of the lower extremity strength assessment using Manual Muscle Testing (MMT).⁴

The patient was using a platform crutch to perform standing transfers and was able to perform a standing pivot transfer from the car to wheelchair with moderate assistance of one. Standing tolerance upon admission was

approximately 45 seconds. Her standing balance was not assessed due to the weight bearing precautions in place. Upon arrival at the TCU, she was requiring minimal assistance in changing body position from supine to sit, minimal assist of 1 and a second person for balance when coming from sit to stand. She was independent with sit to supine transitions. Treatment provided at the time of evaluation included introduction to a sliding board for assistance in transferring from her wheelchair to bed and back again. She required minimal assistance with verbal cueing to complete this, and she was also able to complete this transfer from wheelchair to toilet.

TABLE 1: STRENGTH ASSESSMENT	Right lower extremity	Left lower extremity
HIP FLEXION	4+/5	4+/5
HIP ABDUCTION (tested above the knee)	4/5	3+/5
HIP EXTENSION	4+/5	4+/5
QUADRICEP	4+/5	Not assessed*
HAMSTRING	4+/5	Not assessed*
DORSIFLEXION	4/5 with pain	Not assessed*

*not assessed due to recent fracture

It was determined that this patient's problem list consisted of the weight bearing precautions at the three joints which received surgical intervention to correct fracture (right shoulder, left thumb and left lower extremity), decreased

strength and endurance due to previous bout of bed rest and decreased amount of activity, and also the inability to transfer independently without the use of an assistive device. Due to the diagnosis of multiple fracture, this patient was placed under the Physical Therapy Practice Pattern 4I: Impaired Joint Mobility, Motor Function, Muscle Performance, and Range of Motion Associated With Bony or Soft Tissue Surgical Procedures; ICD-9 code: Fall-related trauma (800-904, 910-957). The initial goals for therapeutic intervention are listed in Table 2.

Table 2: Anticipated Patient Goals
1. Patient will complete sit to stand transfer with contact guard assist of 1 and maintain weight bearing status within 3 weeks.
2. Patient will be able to transfer sit to stand independently within 5 weeks.
3. Patient will be able to transfer supine to sit independently.
4. Patient will be able to stand for 90 seconds with minimal assistance of 1 in 2 weeks and 3 minutes in 6 weeks to assist with peri care and dressing.

Prognosis and Plan of Care

According to the Guide to Physical Therapist Practice, 80% of the patients who are classified into practice pattern 4I will achieve anticipated goals and expected outcomes within 6 to 70 visits. Based on the motivation this patient possessed her prognosis was set as good, however due to the number of injuries sustained following the fall, she would require an extended rehabilitation process to regain her independence in ADLs and IADLs, ambulation and mobility. She

received physical therapy intervention twice a day and five days a week until discharge to address the limitations noted in the patient's problem list. The plan of care included transfer training, therapeutic exercises to address decreased strength and patient education. There was no specific procedure for re-examination or evaluation used with this patient, however her improvements were noted as she continually reported and demonstrated progress as her weeks in transitional care continued.

Intervention

This patient was seen for 17 visits between 8/28/13 and 9/19/13. During her stay in TCU, physical therapy intervention was planned to address the patient's problem list formulated during examination which consisted of transfer training and lower extremity strengthening. Strength training was targeted at the uninvolved joints to initially build strength that was lost over the preceding period of bed rest and then focused on endurance to return the patient to independence. Exercises involved in lower extremity strengthening are listed in Table 3. On the left lower extremity, the patient was progressed with appropriate increases in resistance. The right lower extremity was in a CAM boot throughout PT intervention and the boot was used as resistance when appropriate. Concentric strengthening of the ankle motions (plantarflexion, dorsiflexion, inversion and eversion) were performed on the right ankle with the use of Therabands, to ensure proper healing of the ankle sprain allowing for more independent standing pivot transfers. Core strengthening that followed weight bearing restrictions was also implemented with the use of transverse abdominal sets and reverse sit-ups.

Initially the patient used a sliding board to complete all transfers and she mastered this technique within the first two weeks of intervention. As healing of her right ankle sprain progressed she was able to begin utilizing a standing pivot transfer with the assistance of a one person, a pivot disc and a platform walker under left arm. As weight bearing restrictions of the left lower extremity were decreased by the physician to toe-touch weight bearing, the use of a bathroom scale was incorporated during intervention sessions to monitor the weight the patient would bear during sit-to-stand and standing pivot transfers. This patient also received physical therapy intervention and education regarding car transfers.

Prior to discharge, a home visit was completed with a member of the occupational therapy staff in order to assess the patient's home environment and to identify any safety concerns or assistive devices the patient would require. The patient's family had a wheelchair ramp installed at the home, made arrangements to the existing layout of their home to accommodate a wheelchair and also purchased accessories to assist with bathing and dressing prior to her return home.

Table 3: Lower Extremity Exercises for Strength and Endurance

HIP	KNEE	ANKLE (RIGHT)
Seated hip abduction	Long arc quads	Plantarflexion/ Dorsiflexion
Supine hip abduction	Short arc quads	Inversion/ Eversion
Straight leg raise (SLR)	Isometric quads	Towel scrunches
Seated march	Seated hamstring curl	Ankle circles
Seated adductor squeeze	Heel slides	Rockerboard anterior/posterior
		Rockerboard side/side

Outcomes

At the time of discharge this patient had met the following goals: She was able to complete all sliding board transfers independently and was able to stand with contact guard assist. She expressed that she did not feel comfortable enough to complete a sit-to-stand transfer independently as she was still non-weight bearing in her left lower extremity and had not reached a level of self-sufficiency in completing this task in a safe manner.

She was discharged home with the necessary adaptive equipment. Over the course of the patient's twenty-three day stay in transitional care she was able to regain the necessary strength to assist with or independently complete transfers, regain confidence in tasks required to return home safely as well as independently manage pain. The patient's plan for continued rehabilitation was to resume outpatient therapy when the weight bearing restrictions were lifted and she was able begin gait training.

CHAPTER III

DISCUSSION

This case report examined the course of treatment of a sixty-five year old woman following an unintentional fall from heights which resulted in multiple fractures. Physical therapy intervention consisted of a combination of patient specific lower extremity strength training and transfer training within a Transitional Care Unit to successfully allow this patient to return home. The patient received seventeen days of physical therapy intervention and at the time of discharge had gained the necessary strength and endurance to complete all sliding board transfers independently and stand with contact guard assist. The main limitation of this study was the patient specific approach to the plan of care due to the nature of the injuries sustained and the weight bearing restrictions in place at the time of intervention. Future studies similar to this case would be beneficial to determine the effectiveness of this treatment plan.

Reflective Practice

This case report showed that a conservative and active approach to rehabilitation following multiple fractures resulted in improved strength and endurance, allowing the patient to return home to continue the rehabilitation process safely prior to resuming outpatient physical therapy for gait training. Although the outcomes for this patient were successful, there are various components of physical therapy intervention missing which could have affected the outcomes. In addition to the patient's subjective information collected during the initial evaluation, it would have been beneficial to ask how active this sixty-

five year old female was prior to the incident and if she had began to experience balance deficits. Although factors such as unsafe or improper staircases, uneven surfaces, poor light and slippery surfaces may contribute to a fall⁵, the Centers for Disease Control notes that decreased leg strength and balance deficits have the potential to increase the risk of falls in older adults¹.

It is standard practice for physical therapists to collect subjective and objective data to complete CMS required G-Code assessments focusing on functional progression or regression during episodes of care. At the time of initial evaluation, a functional assessment was not completed by the physical therapist or physical therapy student and therefore a baseline G-Code was not established. To track the patient's functional status more accurately the use of the Patient Specific Functional Scale or SF-36 could have been administered to determine the level of impairment this patient was experiencing prior to the initiation of the plan of care, during intervention, and at discharge.

An aspect of patient intervention that could have been modified was the method of monitoring weight bearing during transfer training. Methods used in this case study involved the "clinical examination crude method", which involves using the hand of the physical therapist underneath the patient's foot to estimate the amount of weight bearing, and the use of a bathroom scale for static measurements. Hurkmans et al⁶ reported that the use of biofeedback systems will more reliably and accurately monitor the amount of weight a patient would bear through the involved left lower extremity during transfer training and would provide auditory cues. Due to the cost of this type of system it was not available

at the TCU. The authors concluded that the use of bathroom scale allows the measurement to be more accurate and less subjective than the clinical examination crude method, however the choice of methodology largely depends on the clinical use and available budget.⁶

Although changes to this patient's plan of care does not seem necessary due to the outcomes, it is unknown whether the interventions and education incorporated during the patient's TCU stay had adequately prepared her and her husband for a return to modified independence following discharge. It is also unknown if the interventions were effective in promoting successful gait training or if this patient was able to initiate gait training without any lower extremity muscle imbalances. Based on the patient's progress and positive outcomes throughout physical therapy intervention, referral to other disciplines was not necessary. The patient frequently had appointments with the involved orthopedic surgeons to monitor the status of the healing fractures and ORIF and adjust weight bearing precautions appropriately.

As a future professional in physical therapy, my thorough analysis and breakdown of multiple components in this case report have influenced my critical thinking skills as well as my ability to seek out relevant and evidence-based research. Self-reflection of the included interventions, the outcomes experienced and the evidence that either supports or disagrees with these outcomes has allowed me to grow as a beginning clinician and incorporate critical thinking skills to evaluate myself and changes I would make if faced with a similar condition in

the future. The use of this evidence-based knowledge has helped me to identify my clinical strengths and areas that I can improve on in future practice.

This case report helped me to recognize the benefits of possessing a well-rounded background of knowledge and an open-minded approach to evaluating and treating a particular condition. In this case, the importance of establishing the patient's goals as well as remaining focused on their functional abilities was the key to developing an appropriate plan of care and executing an effective intervention plan. The outcomes and analysis of this case will always be significant in my future practice, as it was this experience that allowed me to see outside of the box of the textbook physical therapy examination and led me to more creative approaches to guiding a patient through the rehabilitation process.

REFERENCES

1. Falls Among Older Adults: An Overview. Centers for Disease Control and Prevention Web site.
<http://www.cdc.gov/homeandrecreationalafety/falls/adultfalls.html>. Reviewed September 20, 2013. Accessed October 8, 2013.
2. Hahn MP, Richter D, Ostermann PA, Muhr G. Injury pattern after fall from great height. An analysis of 101 cases. *Unfallchirurg*. 1995 Dec;98(12):609-13. German.
3. Helling TS¹, Watkins M, Evans LL, Nelson PW, Shook JW, Van Way CW. Low falls: an underappreciated mechanism of injury. *J Trauma*. 1999 Mar;46(3):453-6.
4. Reese, N. B. (1999). *Muscle and sensory testing*. Philadelphia, Pa: W.B. Saunders.
5. Gulati D, Aggarwal AN, Kumar S, Agarwal A. Skeletal injuries following unintentional fall from height. *Turkish Journal of Trauma and Emergency Surgery*. 2012;18(2):141-146.
6. Hurkmans HLP, Bussmann JBJ, Benda E, Verhaar JAN, Stam HJ. Techniques for measuring weight bearing during standing and walking. *Clinical Biomechanics*. 2003;18:576-589.
7. Alexander BH, Rivara FP, Wolf ME. The cost and frequency of hospitalization for fall-related injuries in older adults. *American Journal of Public Health*. 1992;82(7):1020-1023.
8. Bergstrom U, Bjornstig U, Stenlund H, Jonsson H:S, O. Fracture mechanisms and fracture pattern in men and women aged 50 years and older; a study of a 12-

year population-based injury register, Umea, Sweden. *Osteoporosis Int.* 2008;19:1267-1273.

9. C. M. Court-Brown, K. E. Bugler. Adult fractures: Who gets them and why?. *The Journal of Bone & Joint Surgery.* 2011.

10. Clement N.D., Aitken S, Duckworth A.D., McQueen M.M., and C.M. Court-Brown. Multiple fractures in the elderly. *J Bone Joint Surg Br.* February 2012;94-B(2):231-236.

11. Court-Brown CM, Aitken SA, Ralston SH, McQueen MM. The relationship of fall-related fractures to social deprivation. *Osteoporosis Int.* 2011;22:1211-1218.

12. Hughes MS, Bauer MW, Della Rocca GJ, Crist BD. Orthopedic injuries from deer stands and their functional outcome. *Journal of Surgical Orthopaedic Advances.* 2013;22(2):123-126.

13. Hustedt JW, Blizzard DJ, Baumgaertner MR, Leslie MP, Grauer JN. Is it possible to train patients to limit weight bearing on a lower extremity? *Orthopedics.* 2012 Jan 16;35(1):e31-7.

14. Kannus P, Parkkari J, Koskinen S, Niemi S, Palvanen M, Vuori I. Fall-induced injuries and deaths among older adults. *JAMA.* 1999;281(20):1895-1899.

15. Kubiak EN, Beebe MJ, North K, Hitchcock R, Potter MQ. Early weight bearing after lower extremity fractures in adults. *J Am Acad Orthop Surg.* 2013;21:727+.

http://go.galegroup.com.ezproxy.undmedlibrary.org/ps/i.do?id=GALE%7CA354146955&v=2.1&u=ndacad_58202zund&it=r&p=EAIM&sw=w&asid=cb2ec6d21da1b03ef5785af15643ecda.

16. Wise TRL, Laurence ED, and Martin W Field. Adaptive device for increasing transfer mobility in a

patient with multiple fractures: Suggestion from the field. *PHYS THER*.

1988;68:1121-1122.

17. Walker J (2013) Management of common fractures. *Nursing Older People*.

25, 1, 30-36. *Date of submission: October 31 2012. Date of acceptance:*

November 9 2012.