OUTPATIENT PHYSICAL THERAPY FOR A GERIATRIC PATIENT WITH HIP
OSTEOARTHRITIS

A Doctoral Project
A Comprehensive Case Analysis

Presented to the faculty of the Department of Physical Therapy
California State University, Sacramento

Submitted in partial satisfaction of
the requirements for the degree of

DOCTOR OF PHYSICAL THERAPY

by
Jessica Padilla

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2015
OUTPATIENT PHYSICAL THERAPY FOR A GERIATRIC PATIENT WITH HIP OSTEOARTHRITIS

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by

Jessica Padilla

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I certify that this student has met the requirements for format contained in the University format manual, and that this project is suitable for shelving in the Library and credit is to be awarded for the project.

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Dr. Edward Barakatt

Department of Physical Therapy
Abstract

of

OUTPATIENT PHYSICAL THERAPY FOR A GERIATRIC PATIENT WITH HIP OSTEOARTHRITIS

by

Jessica Padilla

A patient with hip osteoarthritis was seen for physical therapy treatment for sixteen visits from June 13 to August 11, 2014 at an outpatient clinic under the supervision of a licensed physical therapist.

The patient was evaluated at the initial encounter with strength and range of motion measures, Berg Balance Scale, Dynamic Gait Index, 10 meter walk test, and 6 minute walk test, and a plan of care was established. Main goals for the patient were achieving functional community ambulation with decreased hip symptoms and increased balance. Main interventions used were exercise therapy, manual therapy, and gait training. The patient achieved the following goals: increased lower extremity strength, increased hip extension range of motion, decreased pain when walking, increased endurance, increased gait speed, and improved balance. The patient was discharged with a home exercise program after completion of physical therapy intervention.

_______________________, Committee Chair
Dr. Bryan Coleman Salgado

_______________________
Date
ACKNOWLEDGEMENTS

I want to thank my parents, Florecita and Wilfredo Padilla for their constant love and support since I entered this world and their recognition of my talents and passion to help others. To my best friends, Willy and Mimi, your presence in my journey toward self-discovery has been amazing and will continue as we all grow old together. I want to thank my DPT classmates of 2015 for their companionship and good times. To my professors and mentors for their vast knowledge, patience, and care, I am grateful for your guidance. I want to thank my farmer’s market community for keeping me grounded and not letting me forget my roots. Lastly, I would like to thank my boyfriend Bryan for all his love and support throughout the years.
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</table>
Chapter 1

General Background

Osteoarthritis (OA) is the progressive narrowing of joint space due to articular cartilage damage and osteophyte formation at the joint margin.\(^1\) The disease is caused by a combination of biochemical, biomechanical, inflammatory, and immunologic factors.\(^2\) The synovial lining of the joint erodes and damages the articular surface causing structural and functional failure.\(^2\) Damage to the joint structure will further cause problems with daily activities and pain. The symptoms caused by hip OA include deep aching and generalized pain, which cause individuals to seek medical attention.\(^2\) There are two classes of OA; primary and secondary. Primary OA is the most common, using localized symptoms only in 1 or 2 joints; secondary OA is associated with a known cause, such as trauma, metabolic or endocrine disorders, congenital factors, or other types of arthritis.\(^2\)

The incidence of hip OA has been estimated to be 88 per 100,000 in the United States general population, and has a prevalence of 10% in the United States.\(^3\) More than 60 million adults in the United States are thought to have OA, with 5% of the population being over the age of 65.\(^1,4\) Risk factors associated with OA are genetic, constitutional, and biomechanical, with prevalence increasing with age. About 40-60% of hand, knee, and hip OA are associated with genetic factors.\(^5\) Constitutional factors include being over the age of 60, being a female, being overweight or obese, and having a high bone density.\(^5\) Biomechanical factors include joint injury,
occupational/recreational overuse, reduced muscle strength, joint laxity, and joint misalignment.\textsuperscript{5}

OA is a progressive disease that gets worse over time causing joint pain and stiffness.\textsuperscript{5} Pain and stiffness associated with hip OA cause difficulty in daily activities such as walking and stair climbing.\textsuperscript{6} Elderly persons disabled by hip OA often seek medical attention to treat the underlying problems. Conservative treatment options include physical therapy patient education, weight loss, exercise, assistive devices, acupuncture, ultrasound, and medications.\textsuperscript{2} Once diagnosed, OA treatment options aim to decrease pain, prevent disease progression, minimize disability, and improve quality of life.\textsuperscript{2} When conservative treatments fail, many individuals opt for surgery, which may include total joint arthroplasty, joint lavage, or debridement.\textsuperscript{2} The prognosis for hip OA is poor compared to other joints in the body as the disease will often progress to a point where hip replacement is needed 1 to 5 years after diagnosis regardless of the amount of conservative treatments used.\textsuperscript{5} Over 200,000 total hip arthroplasties (THA) or “replacements” are performed annually in the United States because of the severe impairments caused by the disease.\textsuperscript{4} Because OA occurs mainly in the elderly, comorbidities associated with aging can further worsen the prognosis and outcomes of the patient.
Chapter 2

Case Background Data

Examination – History

The patient was a 79-year-old male who had a history of left hip pain during walking. He was diagnosed with OA of the left hip by his physician and was referred to physical therapy because of his difficulty with walking and balance. He received a cortisone shot in his left hip to manage pain and inflammation in March 2014. The patient had a history of right hip OA and had physical therapy in the past to manage it; he eventually sought surgical treatment and had a right total hip arthroplasty in 2013. Radiographs of the left hip were taken in 2013 showing decreased joint space.

Past medical history included lumbago, unspecified hyperplasia of prostate, hyperlipidemia, actinic keratosis, osteoporosis, colonic polyps, malignant neoplasm of the skin, neck, and face; shoulder pain, cervical radiculopathy, divergence insufficiency, degenerative joint disease of the knee (not specified), gastrointestinal bleeding, status post pulmonary embolism, status post deep vein thrombosis, and metastatic malignant melanoma (location not specified). His past surgical history included excision of a malignant melanoma of the skin, removal of tonsils in his youth, removal of cataracts and insert of lens, and THA in 2013. He had procedures for a colonoscopy and esophagogastroduodenoscopy. He reported completing a trial of immunotherapy for cancer remission and would be off the drug treatment in 4-5 weeks.

Social history included being married with no children, and retired from a utility company as a field worker. His wife played an active role in maintaining his
health and lifestyle. He travelled internationally and stayed active by walking his dog. He participated in the community with moderate functional mobility.

The patient’s chief complaint was left hip pain and difficulty walking around the community which he believed was due to his decrease in range of motion in his left hip. He reported having stiffness in the morning, and described the pain as a dull ache that is continuous throughout the day and became sharp at times. Increased walking and stair climbing aggravated the pain and no activity eased it. It was moderately severe, low intensity, musculoskeletal and degenerative in nature, chronic, and was getting worst. He lived in a single-family home, and reported no difficulties navigating around the house. The house had three stairs without rails to the front and back entrance, as well as ten stairs with rails to get to the second floor. He used a single trekking stick on his right side as an assistive device in the community and reported not using it within his home. His physical therapy goal was to attend a car show in March and to be able to walk around “like a normal person”. The musculoskeletal system is affected by the OA, but other systems that appear to be impaired based on his medical history include the integumentary, cardiovascular, urogenital, digestive, and immune systems.

**Examination - Medications**

Patient reported being in a trial of immunotherapy for cancer remission and did not report the name. He reported joint pain as a side effect of the medication. He was status post local injection of cortisone to the left hip for relief of pain and inflammation, which is caused by OA. Cortisone shots are administered no more than
three to four times a year because side affects may cause deterioration of joint cartilage.7

Table 1

Medications

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>DOSAGE</th>
<th>REASONS</th>
<th>PT SIDE EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin (Lipitor®)</td>
<td>20 mg</td>
<td>To decrease cholesterol and fatty substances in the blood</td>
<td>Headache, joint pain, confusion, muscle pain, tenderness, weakness, lack of energy, nausea, extreme tiredness</td>
</tr>
<tr>
<td>Prednisone (Deltasone®)</td>
<td>20 mg</td>
<td>Arthritis</td>
<td>Headache, dizziness, inappropriate happiness, extreme changes in mood, slowed healing, extreme tiredness, weak muscles, difficulty breathing or swallowing</td>
</tr>
<tr>
<td>Multi-vitamin</td>
<td>1 tablet</td>
<td>For a well-balanced diet</td>
<td>Upset stomach</td>
</tr>
<tr>
<td>Calcium citrate/Vitamin D</td>
<td>1 tablet</td>
<td>For low amounts of calcium to support healthy bones, muscles, nervous system, and heart.</td>
<td>Upset stomach, vomiting, stomach pain</td>
</tr>
<tr>
<td>Glucosamine complex</td>
<td>1 tablet</td>
<td>OA</td>
<td>Upset stomach</td>
</tr>
</tbody>
</table>
Chapter 3

**Examination- Tests and Measures**

Tests and measurements used in the case study included methods to assess participation restrictions, activity limitations, and body structure/function deficits which follow the International Classification of Functioning, Disability, and Health (ICF) model. The patient verbally stated his decreased ability to walk around the community for long distances, and reported his goal is to attend a car show without difficulties in walking, which is a participation goal. A self report questionnaire called the Lower Extremity Functional Scale (LEFS) was used to subjectively measure his participation restrictions at week 5 and week 10.

Activity limitations included walking and balance deficits as he ambulates in the community. Measurements to assess walking limitations included observation of gait pattern, scales to measure weight bearing in quiet stance while standing on both legs, and walking velocity as measured by the 10-meter walk test (10 MWT). Measurements for balance limitations included the Berg Balance Scale (BBS) for balance, and the Dynamic Gait Index (DGI) for balance during gait.

Body structure/function impairments measures included affected side hip range of motion and lower extremity strength, aerobic capacity and endurance, and pain. Measurements to assess range of motion included goniometric measures of the both hips in all directions. Weakness of the lower extremities was assessed by manual muscle testing with the patient in sitting because he was unable to tolerate standard
testing position. The 6-minute walk test (6MWT) was used to assess cardiovascular
endurance. Pain was measured using the numeric pain rating scale.

Tests and measures and their characteristics used in this case study are as follows:

- The LEFS is a patient reported outcome measure addressing ability to perform
  functional tasks. It is a questionnaire with 20 questions specific to patients with
  lower extremity conditions. The scores range from 0-80 points, with higher
  scores indicating high functional status. The minimal detectable change
  (MDC$_{95\%}$) is 9 points and the minimally clinically importance difference
  (MCID$_{95\%}$) is 9.9 for individuals with hip OA. The LEFS is clinically
  interpreted into hierarchical functional levels, which are broken up into five
  stages based on scores: Stage 1 (scores 0-20) physiological exercise only, Stage
  2 (scores 20-35) household ambulatory, Stage 3 (scores 35-48) limited
  community ambulatory, Stage 4 (scores 48-61) independent community
  ambulatory, and Stage 5 (scores 61-80) active community ambulatory. This
  measure has excellent test-retest reliability (r= 0.86), excellent internal
  consistency (alpha=0.92), and construct validity.

- The 10 MWT is used to evaluate the time it takes a patient to walk at his/her
  self-selected speed or fastest speed for ten meters. The patient walked as his
  most comfortable self-selected speed. It is used to assess functional mobility
  and gait speed; it can also predict risk for falls. Cut-off scores for ambulation
  ability have been used to classify patients in different categories, which include
  <0.4 m/s were more likely to be household ambulators, 0.4-0.8 m/s were
limited community ambulators, and >0.8 m/s were community ambulators.\textsuperscript{10} The MDC scores were not available for this population, but an MCID\textsubscript{95%} has been established in the geriatric populations as 0.05 m/s for a small meaningful change and 0.13 m/s as substantial meaningful change.\textsuperscript{11} Normative data for gait velocity for patients with hip OA have not been established, but it has been established for normal healthy adults 20-79 years of age. Cut-offs for adult’s in their 70s have been reported as 1.33 m/s.\textsuperscript{12} This age group was selected based on the patient’s age in this case report.

- The BBS is a clinical measure of functional balance consisting of 14 motor tasks that are scored on a 5-point ordinal scale (0-low level of function; 4- high level of function).\textsuperscript{13} The MDC has been established for the elderly population based on the initial score, which will be presented stratified by initial score as follows: (range of score) = MDC\textsubscript{95%}. (0-24) = 4.6; (25-34) = 6.3; (35-44) = 4.9; (45-56) = 3.3.\textsuperscript{14} Cut-off scores for fall risk have been established in the elderly. A score of 56 indicates functional balance and scores <45 indicate greater risk of falling.\textsuperscript{15} The BBS is a prognostic measure for probability of falling for the elderly. It has 91\% sensitivity and 82\% specificity when considering BBS with a cut off score ≤51 and past history of falls, and 77\% sensitivity and 86\% specificity when considering only the BBS with a score ≤49.\textsuperscript{16}

- The DGI is a measure to assess balance in older adults when performing gait tasks such as walking at variable speeds on a level surface, walking while performing head turns, traversing over and around objects, stair climbing, and
performing quick turns while walking. Each activity is scored on an ordinal scale with 3 being the highest, indicating normal balance, and 0 being the lowest, indicating severe impairment. The highest possible total score is 24 points. The MDC\textsubscript{95\%} for community dwelling elderly is 2.9 points. The MCID has been established for community-dwelling older adults according standard baseline deviation. The MCID\textsubscript{95\%} for total points of the same population was 1.90 points; 1.80 for subjects with scores <21/24; 0.60 for subjects with scores \(\geq\)21/24. The DGI is diagnostic tool in which a score of <19 a higher fall risk. This cut off score on the DGI has a 59% sensitivity and 64% specificity in predicting falls. The positive likelihood ratio is 1.6 and the negative likelihood ratio is 0.64.

- Goniometry was used to measure hip range of motion in degrees, including flexion, extension, adduction, abduction, internal rotation, and external rotation. Limited range of motion in patients with hip and knee OA have been prognostic of observed and self-reported disability. The results of this study calculates a Pearson’s correlation coefficient of observed decreased hip extension for patients with hip OA as \(R = -0.52\), and has reported a multiple regression analysis for observed disability for hip OA in the direction of extension with the presence of a flexion contracture was \(Y = -0.515\). This negative correlation suggests that with decreased range of motion in extension, there is an increase in disability. A study by Arnold et al reports pain with passive range of motion in an osteoarthritic hip or knee yields a fall risk ratio (RR) of 1.9 (95\% CI, 1.3-
There is no standardized measure of change in range of motion for patients with hip OA, but the intratester reliability for universal goniometry for extension is 3.5°.¹⁰

- To measure muscle strength throughout the body, MMT was used. I used the ordinal numeric scale of 0 to 5; 0 means no muscle activity and 5 being normal muscle strength. Measures of MMT for detecting between-side differences in muscle force compared to dynamometry resulted in the following psychometrics for 20% deficits: sensitivity from 68.3%; specificity 88.6%; negative predictive values (NPV) ranged from 66.1%; positive predictive values (PPV) ranged from 89.6%.²¹ The adequacy of MMT for detecting muscle deficits relative to the normal for 20% deficits for non-dominant (ND) versus dominant (D) side include the following: sensitivity ND: 63.1%, D: 65.4%; specificity ND: 100%, D: 90%; NPV ND: 18.4%, D: 24.3%; PPV ND: 100%, D: 98.1%. A PPV 100% means the patient will have a muscle deficit on the affected limb when compared to the unaffected limb if there are between-side differences in strength.²¹ Furthermore, a median odds ratio (OR) of 4.0 (95% CI, 2.5-7.7) suggests strength reductions are significantly associated with symptoms when comparing patients with limb complaints to those without complaints.²² The odds of strength reductions with associated symptoms are four times greater than a patient without strength reductions.

- The 6 Minute Walk Test (6 MWT) is used to assess the distance walked over six minutes as a sub-maximal test of aerobic capacity and endurance. This tool
is good for estimating exercise tolerance, functional status, $V_{O2max}$, and survival. The subject can walk at his/her fastest or preferred speed and is allowed to use an assistive device if necessary. The MCID$_{95\%}$ of the 6MWT for both the geriatric and stroke populations has been reported as 50 meters. The numeric pain rating scale (NPRS) is based on an 11-point pain intensity rating from 0= being no pain to 10= the worst pain possible. The MCID$_{95\%}$ for chronic pain, which includes OA, is a change of 1.7 points from baseline or percent change score of -27.9%. Hip and knee pain in the previous month for men >55-years old show an OR 2.3 (95% CI, 1.4-3.8) for locomotor disability upon physical examinations. A study reported patients with pain in the lower extremity will have an increase in fear of falling due to a decrease in their falls efficacy, which is the belief in their ability to perform a task without falling. Reports of any amount of pain in joints with arthritis contributes to increased functional loss, decreased neuromuscular control of large muscles used for stability, and has contributed to emotional stress decreasing activities and participation in society. Pain rating was used to assess status of the patient before, during, and after treatment sessions to adjust plan of care, treatment, and goals.

- To assess weight-bearing status, two bathroom scales were used to assess the weight bearing status on both lower extremities. There are no psychometrics using scales to assess weight bearing for the lower extremities. Normal weight bearing should be symmetrical between both lower extremities causing optimal
stability during quiet stance. Unequal weight bearing can increase risk of falling due to asymmetries in the center of pressure in both feet.  

• Gait pattern was assessed by observation.

Table 2
Examination Data

<table>
<thead>
<tr>
<th>BODY FUNCTION OR STRUCTURE IMPAIRMENTS</th>
<th>Hypothesized ROM in L hip</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Active</td>
</tr>
<tr>
<td>Direction (Normal value)</td>
<td>Left</td>
</tr>
<tr>
<td>Flexion (F) (125°)</td>
<td>10° to 115°</td>
</tr>
<tr>
<td>Extension (E) (30°)</td>
<td>- 10° (soft tissue contracture)</td>
</tr>
<tr>
<td>Adduction (Add) (30°)</td>
<td>0° to 25°</td>
</tr>
<tr>
<td>Abduction (Abd) (30°-50°)</td>
<td>0° to 40°</td>
</tr>
<tr>
<td>Internal rotation (IR) (40°)</td>
<td>0° to 30°</td>
</tr>
<tr>
<td>External rotation (ER) (60°)</td>
<td>0° to 50°</td>
</tr>
</tbody>
</table>

Lower Extremity MMT

*Limited by Pain

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip flexion</td>
<td>3/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Hip extension</td>
<td>Not measured; Unable to tolerate testing position</td>
<td>Not measured; Unable to tolerate testing position</td>
</tr>
<tr>
<td>Hip Abduction</td>
<td>Not measured; Unable to tolerate testing position</td>
<td>Not measured; Unable to tolerate testing position</td>
</tr>
<tr>
<td>Hip external rotation</td>
<td>3*/5</td>
<td>4/5</td>
</tr>
<tr>
<td>Hip internal rotation</td>
<td>4*/5</td>
<td>4*/5</td>
</tr>
<tr>
<td>Knee flexion</td>
<td>5/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Knee extension</td>
<td>5/5</td>
<td>5/5</td>
</tr>
</tbody>
</table>

Hypothesized decreased aerobic capacity and endurance

6 MWT with single point cane | Distance: 177 meters
<table>
<thead>
<tr>
<th>Pain</th>
<th>Description: stiff, dull ache, sharp</th>
</tr>
</thead>
</table>

**ACTIVITY LIMITATIONS**

<table>
<thead>
<tr>
<th>Limited Ambulation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Deviated gait</td>
<td>Observational Gait Analysis: Body weight shifted to the right, decreased weight bearing on left LE during stance phase causing right foot to drag during heel off, decreased cadence, large step through length with left leg and decreased step length on right, step-to gait pattern with hiking pole. Crouched gait pattern due to left hip contracture in flexion. Present antalgic gait.</td>
</tr>
<tr>
<td>Increased weight bearing on right LE in static standing balance</td>
<td>Scales to measure weight bearing (maximal assistance from cane used for standing balance): Right leg: 120 lbs. Left leg: 60 lbs.</td>
</tr>
<tr>
<td>Decreased walking velocity</td>
<td>10 MWT with single point cane</td>
</tr>
</tbody>
</table>

**Balance**

| Decreased balance in upright standing activity | Berg Balance Scale Score: 37/56 | Category: walking with assistance; medium fall risk |
| Decreased dynamic gait | Dynamic Gait Index Score: 15/24 | Interpretation: ≤ 19/24 predictive of falls in the elderly |

**PARTICIPATION RESTRICTIONS**

Limited community ambulation with single point cane. Patient reports he would like to walk around a car show in August (Three months from initial encounter) without difficulty walking, which includes 4 hours of standing and walking on different surfaces. The LEFS was used later in the episode of care to assess his self-reported walking ability at the 10th visit (score=61/80) and 16th visit.
Chapter 4

Evaluation

Evaluation Summary

The patient reported left hip pain described as sharp at worst, constant dull ache, and stiffness that limited his ability to walk in the community. Signs of decreased hip strength, decreased range of motion, and decreased endurance have been quantified with MMT, goniometry, NPRS, and 6 MWT, respectively. A limitation in his left hip extension range of motion, due to a flexion soft tissue contracture, was associated with increased disability. Ambulatory limitations were qualitatively measured by means of visual observation of the patient performing walking tasks with an assistive device. He had increased right lower extremity weight bearing in static stance, bearing approximately twice the amount of weight bearing on the right lower extremity than on the left. The increased weight bearing on the right lower extremity during static stance was also observed during gait. The patient had an increased fall risk as measured by the BBS and the DGI. His body structure/function impairments of decreased strength contributed to his increased fall risk as measured by the BBS which categorized him as walking with assistance and as a medium fall risk (score: 37/56). On the DGI, he was below the threshold score that is predictive of falls in the elderly (score: 15/24). The patient also had a history of arthritis in the right hip, which was treated by arthroplasty surgery. His medical diagnosis of OA was confirmed by the American College of Rheumatology (ACR). The ACR’s clinical criteria for diagnosing
hip OA include: hip pain, less than 115 degrees of hip flexion, and less than 15 degrees of internal rotation.26

**Diagnostic Impression**

The signs and symptoms, and examination results were consistent with hip OA as diagnosed by his primary care doctor. The patient presented with left hip pain during walking, lower extremity weakness, and limited range of motion contributing to his difficulty in walking.

**Physical Therapy Guide Practice Pattern**

Pattern 4E: Impaired joint mobility, motor function, muscle performance, and range or motion associated with localized inflammation.

**G-Code/s**

Current status G-code with modifier: G8978 CL - Mobility current status - Measured by overall observation of function and mobility during initial evaluation.

Goal status G-code with modifier (10\textsuperscript{th} visit): G8979- CJ- To be measured by overall observation of function and mobility during the 10\textsuperscript{th} visit.
### Chapter 5

#### Plan of Care - Goals and Interventions

Table 3

Evaluation and Plan of Care

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>PLAN OF CARE</th>
<th>Planned Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BODY FUNCTION OR STRUCTURE IMPAIRMENTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased left hip extension A/PROM (contracture)</td>
<td>Increase left hip A/PROM in extension from -10° to -6°</td>
<td>Long axis hip distraction using belt; Sustained and oscillating. Contract-relax method for hip flexion and extension (E) HEP: Stretches for hip flexor: supine stretch for hip flexor (left leg hangs off bed up to 5 minutes), standing hip flexor stretch</td>
</tr>
<tr>
<td>Maintenance lower extremity weakness</td>
<td>Increase hip flexion, IR, and ER strength by one point with limited pain. Maintain knee flexion and extension range of motion.</td>
<td>*Exercises to increase lower extremity strength for balance and walking: - Standing leg abduction - Standing leg extension - Marching - Squats - Step ups on 3 inch step; progress to 6 inch step - Standing balance on foam; eyes open and progress to eyes closed. Add perturbations.</td>
</tr>
</tbody>
</table>
Progress to single leg balance.
- Calf raises
- Heel raises
- Bridges
- Clam shells
- Progress above exercise with added ankle weights.
- 2 sets, 10 repetitions
- (E) HEP: above exercises 3-4 times a week; 2 sets, 10 reps.

<table>
<thead>
<tr>
<th>Decreased aerobic capacity and endurance</th>
<th>Increased aerobic capacity and endurance from 177 meters to 227 meters as measured by the 6MWT (MCID = 50 meters)</th>
<th>Recumbent bike; start at level 1 for 5 minutes and progress to level 2-3 for next 5 minutes Gait training with single point cane on variable surfaces and traversing around and over objects. (E) HEP: Daily walking 30 minutes day.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Increased pain in L hip during walking</th>
<th>Decrease L hip pain by 2/10 points (or reduction of 28%) as measured by the Numeric Pain rating scale (MCID)</th>
<th>Long axis hip distraction with belt Lower extremity strengthening exercise (listed above*)</th>
</tr>
</thead>
</table>

**ACTIVITY LIMITATIONS**

**Limited ambulation**

<table>
<thead>
<tr>
<th>Decreased mobility while walking with assistive device</th>
<th>Increase mobility and stability with single point cane with stand by assistance and maximal verbal cues along 40 feet walkway</th>
<th>Increase mobility and stability with single point cane independently with moderate verbal cues along 40 feet walkway as measured with observation</th>
<th>Gait training using single point cane with verbal cues to stand “tall and proud” taking big steps.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Decreased walking velocity secondary to:</th>
<th>Increase walking velocity from 0.99 m/s to 1.12 m/s (substantial meaningful change = 0.13 m/s) as measured by the 10MWT</th>
<th>Lower extremity strengthening (listed above*)</th>
<th>(E) HEP: walking 30 minutes/day, 5 days/week Step-through gait training with single point cane, increasing weight bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Body shift to right</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Decreased weight bearing on left</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased balance</td>
<td>Increase BBS score from 37/56 to 42/56 as measured by the BBS. (MDC from initial score of 35-44 = 4.9)</td>
<td>Lower extremity strengthening exercises (listed above*)</td>
<td></td>
</tr>
<tr>
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<td>------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Decreased dynamic balance in gait</td>
<td>Increase DGI score from 15/24 to 17/24 as measured by the DGI. (MCID for community dwelling adults: 1.80 for subjects with DGI scores &lt;21/24)</td>
<td>Gait training over variable surfaces (cement, foam mat, rubber mat, dirt, grass) and traversing over and around obstacles (cones, free weights)</td>
<td></td>
</tr>
<tr>
<td>Increased fall risk secondary to poor righting reactions</td>
<td>Decrease fall risk by increase BBS score from 37/56 to 42/56</td>
<td>(E) Fall prevention training: Patient and caregiver education on how to recover from a fall: stay calm, self-assessment of body, look for chair or firm surface and crawl towards. Caregiver instructed to push chair to fallen person. Instructions on how to stand from floor using firm surface. Patient instructed not to use cane to aid in standing. Stepping strategy forward and backwards. Righting reaction training</td>
<td></td>
</tr>
</tbody>
</table>
PARTICIPATION RESTRICTIONS

<table>
<thead>
<tr>
<th>Participation Restrictions</th>
<th>Intervention Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased community ambulation (patient reported)</td>
<td>Increase subjective community ambulation based on the LEFS having scores of 48-61, which categorizes them in independent community ambulatory.</td>
</tr>
<tr>
<td></td>
<td>Lower extremity strength exercises (see above*) Gait training with single point cane on variable surfaces and traversing around and over objects. Fall prevention training (see above*)</td>
</tr>
</tbody>
</table>

Prognostic Considerations

Based on the patient’s presentation from the initial examination, he had a fair prognosis to attain the physical therapy goals. A study on patients with hip OA has reported prognostic factors associated with activity limitations. The factors for worsening activity limitations in patients with hip OA include older age, higher morbidity count, cardiac disease, eyes-ear-nose-throat disease, and higher range of motion hip flexion at baseline.27 This patient was older in age, had multiple comorbidities, and had a positive history of hip OA. Results from the 6 MWT gave prognostic information about his endurance. The patient in this case report walked a distance of 177 meters. Cut-off values for the 6 MWT for community dwelling males 70-79-years old have been reported as 527 meters.28 His multiple comorbidities attributed to this decrease in distance walked.

Factors indicating a good prognosis included the patient’s high motivation level and the full-time support and assistance from his wife. He was not limited in performing household activities, and needed minimal assistance with a single point cane for balance when ambulating in the community. He was determined to reach his
goal in walking “normally” at the upcoming car show. His personality, high cognitive functioning, and eagerness to improve was a driving force to attain positive outcomes with physical therapy.

**Plan of Care- Interventions**

See Table 3.

**Overall Approach**

Pain was assessed before, during, and after treatment sessions in order to adjust treatments when necessary. Treatment interventions included task-specific over-ground gait training using a single point cane to improve his deviated gait pattern. Changing the assistive device from a single trekking stick to a single point cane increased balance while walking and was more ergonomic in his hand. The trekking stick was not ergonomic, caused deviations in gait pattern, and decreased his overall balance. Furthermore, the assistive device caused him to lower his base encouraging a crouched posture that further increased his risk of falling. This method of holding the trekking stick decreased his overall grasp as well as his balance. An ergonomic properly fitted single point cane improved his balance, stability, and posture while walking.

Full body mirrors were used to provide the patient knowledge of results feedback to encourage midline posturing while walking. Bathroom scales provided the patient feedback to assist him in shifting his body weight from his right leg to his left. Over-ground gait training included variable surfaces (linoleum, rubber mats, foam mats, cement, dirt, and grass) that simulated indoor and outdoor walking conditions specific to the patient’s goal in walking at a car show, which is located at a golf course.
Cones and dumbbells were placed on the ground for the patient to traverse over and around to simulate objects he may encounter in everyday walking conditions. Verbal cues were used to encourage a step-to gait pattern by taking big, equal steps and walking “tall and proud” because of the patient’s tendency to look down at his feet when walking.

Lower extremity exercises included standing kitchen sink exercises, balance activities on foam, step climbing, and supine and side lying exercises to strengthen hip internal rotation, external rotation, flexors, extensors, and abductors. The overload principle was used for strengthening, stretching, and endurance exercises. It suggests increasing vigor of exercise when the musculoskeletal system has plateaued at a lower level of intensity. Increasing the vigor of exercise includes increasing the intensity, volume, or frequency. A volume of 2 sets, 10 repetitions for a frequency a day 3-4 times a week was used. Once the patient was accustomed to perform the exercises ankle weights (1-3 pounds) and step height (3 inches) were added to increase the intensity of the exercise. For patient safety the intensity of the exercises was applied in the clinic for supervision and safety purposes.

The principle of tissue creep responding to prolonged stretching was applied to treat the patient’s left hip contracture by including supine hip flexor stretch with his left leg hanging off the bed. The goal was to have him hold the stretch for 30 seconds, twice a day. The duration was increased by 30-second intervals to a goal of 5 minutes. The contract-relax method of the hip flexors was used during the therapy session to increase hip extension range of motion. While in supine, the patient was instructed to
contract for 5 seconds into hip flexion and relax 10 seconds into hip extension for 3 sets. The creep supine hip flexor stretch and contract relax stretch were taken out of the treatment plan at the ninth visit because the patient complained of increased pain and decreased function after they were performed. To supplement his home exercise program a standing hip flexor stretch was performed once a day for 30 seconds to increase range of motion. Manual therapy included long axis hip distraction using a belt. This method was used to decrease pain within the joint capsule and increase mobility. Sustained and oscillatory mobilizations were used in varying grades based on the patient’s pain.

Endurance training included daily walking for 30 minutes a day for his home exercise program, which were broken down into three ten-minute intervals, with a focus on gait training principles stated above. Endurance training in the clinic will include a 5-minute warm up with level 1 resistance and 5 minutes with level 2-3 resistance. The level was based on the patient’s selected resistance.

An educational intervention of fall prevention training was presented to the patient to decrease future falls. This included caregiver roles in moving the appropriate furniture needed to assist him in standing and not pulling him up for their safety. The patient was instructed to adapt their home environment (move throw rugs, space out furniture, declutter objects) for decreasing fall. The training included how the patient should respond when a fall occurs and how to maneuver towards sturdy furniture to help with standing. Additional fall prevention training included stepping strategy and
progressing to reaction training in directions forwards and backwards with stand-by assistance by the PT and against a wall for additional safety.

**PICO Question**

For a 79-year old male patient with symptoms associated with hip OA (P), are strengthening exercises (I) more effective than manual therapy (C) for improving overall pain and function (O)?

The articles used to address the question included a randomized control trial (RCT) and a systematic review (SR). The first RCT compared manual therapy and exercise therapy alone in patients with hip OA for changing function and pain. Exercise interventions included a protocol developed by Van Baar et al.29 This included 25 minutes of treatment for muscle function, range of motion, pain, and walking ability. Treatment sessions were twice a week for a total of nine sessions. Treatments in manual therapy used manipulation and stretching. The timeline for manual therapy was the same as exercise therapy. Patients with hip OA were measured at baseline, after the nine treatment sessions, and 3 and 6 months after treatment was completed. Outcome measures include general improvement based on a 6-point Likert scale, quality of life as measured by the Short Form 36, Harris hip score, and walking test. Conclusions of this study found 81% success in perceived functional improvement for manual therapy and 50% success for exercises therapy, suggesting the superiority of manual therapy over exercise therapy for improvements in function 29

The SR (Pedro: N/A; Systematic Review: 1A) researched the efficacy of strengthening exercises for OA. The SR included RCTs studying strengthening
exercises as treatment for patients with OA. Exercise programs had to be joint specific with general strength, flexibility and function; exercise programs had to be progressed, and clients needed to be compliant with the program. The results of the study conclude strengthening exercises are beneficial for improving pain and functional outcomes in patients with OA.

Both studies confirm strengthening exercises are beneficial for managing pain and improving function in patients with hip OA. The results of the study by Hoeksma and colleagues give further evidence that patients receiving manual therapy over exercise therapy will have an increased perception of function. The use of manual and exercise therapy, as treatment would be appropriate for treating my patient with hip OA.
## Chapter 6

### Outcomes

### Table 4

#### Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Initial</th>
<th>Follow-up (10th visit)</th>
<th>Change (Follow up at end of 10 visit)</th>
<th>Discharge (16th visit)</th>
<th>Goal Met Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTCOMES</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>BODY FUNCTION OR STRUCTURE IMPAIRMENTS</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td><strong>Initial</strong></td>
<td><strong>Follow-up</strong></td>
<td><strong>Change</strong></td>
<td><strong>Discharge</strong></td>
<td><strong>Goal Met Y/N</strong></td>
</tr>
<tr>
<td><strong>Goniometry measurement of left hip extension</strong></td>
<td>AROM -10° PROM -10°</td>
<td>AROM -5° PROM -3°</td>
<td>AROM +5° PROM +7°</td>
<td>AROM -5° PROM -5°</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Pain NPRS</strong></td>
<td>4/10 when walking</td>
<td>“Dull ache” 0.5/10 when walking</td>
<td>Difference: -3.5/10 or 87.5% decrease (MCID: 2/10 or 28%)</td>
<td>0.5/10 pain at rest ≥4/10 when walking, indicating decreased improvement from visit 10.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>6 MWT</strong></td>
<td>177 meters</td>
<td>196 meters</td>
<td>+19 meters (MCID: 50 meters)</td>
<td>Not tested due to pain</td>
<td>No; Goal: 227 m</td>
</tr>
</tbody>
</table>
The patient was a 79-year old community dwelling male that presented with left hip pain and difficulty walking due to a medical diagnosis of hip OA. The patient was seen for a total of 16 visits over 10 weeks. He was re-evaluated at visit 10 and 16. Long-term goals for this case report were recorded at visit 10 to determine changes
made with physical therapy interventions, because Medicare insurance required a re-evaluation at visit 10 to justify continued treatment of this patient. At visit ten, the patient had met most goals related to body structure/function impairments, all goals for activity limitations, and was categorized as independent community ambulator as measured by the LEFS questionnaire. Follow up after the 10th visit he had decreased pain, increased strength, increased hip extension range of motion, increased aerobic endurance, increased gait speed, increased weight bearing on the left hip, and was categorized as decreased fall risk and safe independent community ambulator.

Upon reevaluating the patient on visit 16, outcomes were worse in all areas compared to visit 10. He presented with increased pain with walking and was able to perform only 6 of 9 measures due to pain. Left hip extension PROM decreased by 2 degrees. His ROM measurement was limited due to pain. Strength measures increased slightly but was limited by pain. Pain was reported as 0.5/10 at rest but increased to ≥4/10 while walking. Average walking velocity increased by 0.95 m/s, indicating a higher gait speed regardless of pain. The BBS score decreased by 4 points; still categorizing him as an independent ambulator as measured at week 5. The LEFS scale revealed a -14 point change from visit 10, indicating he is a limited community ambulator. Furthermore, he reported cancelling his plans to attend the car show. The 6MWT, scales for weight bearing, and DGI were not performed due to his poor tolerance for activity at visit 16. Furthermore, treatment was not performed for this patient on the last visit. The patient was scheduled to meet with his primary care physician the next day to investigate increases in symptoms. The patient will be
discharged from PT and remain living at home, his wife will provide minimal to moderate assistance performing activities of daily living. His primary care physician will provide further management of symptom after reassessing his condition.

**G-Code**

G8989 Mobility D/C status (16th visit): CL- as measured by overall observation of function and mobility during discharge.
Chapter 7

Discussion

The patient was a 79-year old male that presented with left hip pain symptoms associated with OA. He was treated at an outpatient facility for a total of 16 visits. Outcome assessments were measured at baseline week 1, week 5, and week 10. Long-term goals were measured at week 5 in order to justify additional skilled physical therapy visits for Medicare. Additional measures were recorded on week 10 to determine if additional benefits were achieved with physical therapy. Comparisons from week 1 and 5 show increases in strength and range of motion; there was a decrease in pain and an increase in walking velocity, cardiovascular endurance, balance, and walking ability and gait pattern. After week 5 the patient reached a plateau, and outcomes decreased after week 10.

The patient responded to treatment intervention as expected since he met long-term goals from the initial evaluation to visit 10. Exercise therapy has been shown to decrease pain and disability in patients with OA by improving strength, joint stability, range of motion, and aerobic fitness.\textsuperscript{31} The patient in the case report achieved similar results as reported by the literature. His advancing age, multiple comorbidities, and history of arthritis predisposed him to poor outcomes, but his high motivation in the rehabilitation process and social support from his wife helped him reach his long-term goals after the 10\textsuperscript{th} visit or week 5. Unfortunately, his performance declined closer to discharge due to progression of the disease, which was later verified by radiograph images from his medical record. Previous research addresses the effects exercise on
patients with hip or knee OA 9 months post intervention. The results of the study show that benefits of exercise declined after 12 weeks and diminished by 24 weeks. The patient in this case study shared similar results of diminished benefits as seen in the research. The patient’s beneficial results declined after 10 weeks versus 12 weeks seen in the research. Another factor to consider in his decrease in outcomes is the wearing off of the effects of the cortisone injection taken in March. A research study reported improvements in hip pain 3 months after receiving local hip cortisone injections, which is consistent with his entry into physical therapy in June. The lasting effect of cortisone injections is variable according to various studies, but this is a possible confounder when hypothesizing his increase in pain after 6 months post injection.

Reflecting on this case study, after establishing a good rapport with the patient, I addressed all of his impairments and limitations associated with his restrictions with walking in the community. I was able to adjust treatments based on the pain presentation and the patient’s goals. When I treat a patient with a similar clinical presentation in the future, I will refine my evaluation. I will chose a different subjective measure for overall activity function. I used the LEFS as an assessment for this patient’s overall function, but I will use the WOMAC in the future as it is a measure specifically for patients with OA, whereas the LEFS is a general measure for lower extremity function.

When generalizing this patient’s clinical performance to future patients, I consider his presentation typical for patients with OA. Patients with OA will seek treatment when they have activity limitations causing structural/functional impairments
caused by the disease. Physical therapy is one of the first treatments used to manage
symptoms associated with the disease. Outcome measures such as MMT, goniometry,
and pain rating are commonly used in the research to clinically diagnose the effects of
OA. Additional outcome measures like the BBS, DGI, LEFS, 6MWT and 10MWT
are used to further investigate activity limitations. Specific treatment interventions
were implemented based on these measures, and guided his plan of care to reach his
goals in community ambulation. The interventions utilized for this patient can be
broadly used for patients with hip OA, but should be modified so that they are specific
to the patient’s goals.

Many studies in the literature have supported my multimodal approach in using
interventions to decrease pain and increase function in my patient. A recent article
from the Journal of American Medical Association looked at the effects of physical
therapy on pain and function in patients with hip OA. Patients in the study were
divided into an active treatment group, which included education and advice, home
exercise, and gait aid, and a sham group receiving inactive ultrasound. All participants
in the study received interventions for 10 visits. Both groups showed improvements in
pain and function, but active physical therapy showed no additional benefits over the
sham group in these measures. The results of the study question whether a
conservative approach from physical therapy is necessary for treating OA; until I found
significant change seen in balance between groups. Although the active group did not
show additional benefit over the sham group in pain and function measures, the active
group did reveal significantly greater improvements in stepping balance. Within group
differences of both the active and sham groups were measured from the initial visit to the 10th visit; measured using the mean scores with a 95% CI. The change for the active group from the initial evaluation to the 10th treatment was an average of 1.5 steps, and an average of 0.2 steps for the sham group; higher scores represent better function or balance. Since balance was an outcome of interest I can be assured that a multimodal approach can be used to make significant improvements in balance. This current evidence can be used to help me determine which form of physical therapy (modalities or multimodal physical therapy) to use in helping improve pain and function for patients given their presentation and vigor tolerance for treatment. As research supports my overall approach, evidence regarding the specific timeline about the decline in performance by rehabilitating patients with hip OA and contraindications of treatment based on patient overall physical presentation could have improved my ability to design a treatment plan.
References


