

The effects of outpatient physical therapy versus home care therapy in regards to recovery  
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## **The effects of outpatient physical therapy versus home care therapy in regards to recovery.**

The time it takes to functionally recover from surgery is crucial for the daily lives of the elderly population. Deciding which method of rehabilitation will optimize the recovery period can be just as important as the therapy itself. For elderly patients (above the age of 65) who have undergone hip replacement surgery, many physical therapists vie for at home care and rehab, while some recommend rehab in an outpatient setting where patients travel to the rehab facility. The ultimate goal of this study is to determine which rehabilitation method, in terms of home physical therapy care or outpatient therapy, has the most optimal recovery for elderly patients with voluntary hip replacement surgery. Specifically, it will be a focus of which therapeutic process leads to a quicker recovery time, which will be based on range of motion (ROM), and the ability to perform daily living tasks, which can improve quality of life.

**Specific Aim 1:** To test the hypothesis that physical therapy facilitated by a therapist would be better for patients compared to patients sent home with instructions for rehab.

**Rationale 1:** It is important to establish the fundamental necessity for facilitation of therapeutic techniques. Especially in the world of the Internet, many surgical patients take it upon themselves to research rehab and therapeutic techniques and perform them on their own. Therefore, displaying the differences amongst at home therapy instructions and that provided by a therapist in an outpatient setting is crucial (1). In terms of form and techniques, as well as feedback, there are some major differences between facilitated therapy with a physical therapist opposed to at home procedures. Especially when it comes to safety and time-managed therapy, it is important to have a therapist as a guide throughout the process (1,9).

**Specific Aim 2:** To test the hypothesis that outpatient physical therapy would be more beneficial for hip replacement patients compared to at home care.

**Rationale 2:** There is a large group of clientele that take advantage of at home physical therapy methods. This is when the therapist travels to the home of the patients rather than the patient going to the outpatient physical therapy setting. Therefore, this targeted goal is a comparison of how setting can make a difference in recovery. At home therapy places an increased amount of focus on the patient, while on the other hand, in an outpatient setting, the patient can find a form of motivation from the rehabilitation environment. To enhance hip replacement patient's recovery and return to being able to perform daily living activities, it is important to determine which method, or setting, can lead to an improved recovery time period, or recovery results in general.

### **Significance:**

Total hip replacement surgery is prevalent procedure in elderly adults (ages 65+). It is especially common in individuals that have arthritis (10). There are over 300,00 total hip replacement surgeries performed every year with about two-thirds of those being on the elderly population, 65 years and older (3). It is extremely important for this population to be able to complete daily living tasks to maintain their self-sufficiency. Thus, it the goal of this project to determine which method of therapy and rehab will be the most beneficial for patients who have elected to get hip replacement surgery. Once the most beneficial setting or method for therapy is determined then it can then be pushed as the main suggestion during the recovery period for these patients. It is the ultimate goal to be able to restore patients that are going through these situations back to where they were previously. Mobility is a critical issue, especially in the older population, so being able to recover more quickly and to a larger degree may help prevent future injuries and allow patients to be more resilient in other aspects as well. It will also be important to be able to distinguish which therapeutic service correspond best with the patients in terms of being able to return to daily living tasks (4).

## Background and Significance:

Total hip replacement surgery is common amongst the populations of older individuals (ages 65+). As time progresses, the “baby boomer” generation will have reached this age threshold, and therefore, total hip replacement surgery will continue to become even more prevalent (6,8). Furthermore, it is important to establish which therapeutic methods will allow this patient population to recover to a better extent while also taking into account the time frame that encompasses the rehab. By improving the recovery process for these individuals it will allow them to return to daily living activities and will also ease financial strain if a concise program is set up that amplifies the recovery process.

Two important considerations that are suggested during the post-operational time period for hip replacement surgeries include out-patient physical therapy as well as at home care. During hip replacement surgery, an artificial socket is placed into where the natural socket is to stabilize an artificial ball and anchor joint (10). Regaining the mobility of the hip joint is the ultimate goal after the procedure is performed and it through physical therapy exercises that this range of motion (ROM) can eventually be met.

There is a multitude of research that is current and discusses factors that come into play during physical therapy (1,5,6,9). To exemplify this, it was found that in a large population of post-operative patients, factors such as “age, obesity and social support all played a role in terms of discharge” (5). Studies such as this one focused on in-patient settings for therapy but did not go into the outpatient setting as a basis for therapy (5,6). It is not only discharge that this study is interested in terms of recovery, but also the quality of recovery and the ratio of quality, or ROM, in comparison with the time of the rehabilitation program. Therefore, measurements will be recorded and progression will be logged using the *Harris Hip Score* (8,10). Due to the fact that total hip replacement surgeries are one of the most common procedures that require rehabilitation post operatively, it will be important to distinguish an efficient method towards recovery and this study will be able to determine that. The focus of this study is also to assume patients will be using therapeutic methods that do not include inpatient care. Therefore, an established independence will already increase self-sufficiency, although it still requires reliance on a therapist and transportation to outpatient centers.

Ultimately, this study focuses on the population of elderly patients that have elected to go through this surgical procedure but also want to remain as self-sufficient as possible. Therefore, not only will physiological capabilities be taken into account, but also the ability to gain independence that these patients hope to achieve. Another consideration that is extremely prevalent with technological advances today is postoperative patients that take it upon themselves to create their own at home therapy. Thus, to put these situations into consideration, it will be a target to compare recovery in patients that are given therapeutic instructions to perform at home on their own versus rehab that is administered and facilitated by a licensed therapist. It was found in recent studies that when patients were entered into an inpatient rehab facility versus a trained nurse facility, those that were in the inpatient facility with therapists facilitating recovery, those that were provided a therapeutic focus and feedback were able to leave the facility sooner (6). Although this finding seems as though it could be brought up as an assumption, it depicts the crucial point of how necessary a licensed therapist is (1). While both groups were treated with the same procedure, the ones that were in the inpatient facility seemed to recover more efficiently. Therefore, this fact will be taken to the next level when comparing outpatient rehabilitation to at home care, as well as at home instructions. Results from the three of these methods, although extrapolated separately, will eagerly lead modern therapists today in a particular direction when suggesting a form of therapy for hip replacement patients.

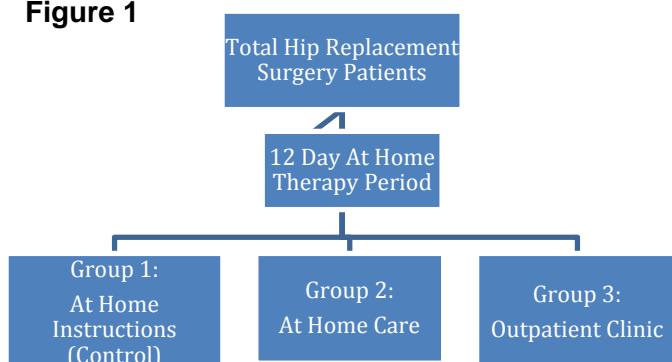
The significance of this study goes far beyond efficiency and suggestive methods for practicing physical therapists. It is important to draw attention to the difference that these physical therapy methods do for postoperative patients. It is ultimately the goal to improve their quality of daily living and reduce pain and discomfort while increasing mobility (4). Therefore, if a sense of independence is achieved from progression physiologically throughout therapy then success is attained. This study is attempting to improve the overall mental and physical health of the patients by focusing on recovery and mobility of total hip replacement surgery. Thus, if a significant difference is found between rehab methods or settings then this can provide good

suggestions for future patients. As strides are made within the healthcare field, this is just another step to produce increased mobility in elderly individuals, which can eventually lead to an increase in longevity as well. It will be remarkable to see an improvement in perceived quality of life because simple daily tasks can be performed sooner and ultimately better. While drawing a conclusion on the relevance of this study, it is important to keep in mind that what is being sought after is independence through physiological and psychological progression and efficiency. It is also the goal to be able to reduce payments for patients due to decreasing the duration of therapy as necessary (6).

## Experimental Plan:

With a background behind the motivation for this study, the specific aims formulated can then be understood and approached in a clear light. The subjects that will be included in this study will be divided into groups. The target is to have a minimum of 30 subjects and a maximum of 50 subjects for each group. There will be an informed consent agreement signed in all subjects willing to participate in the study. Any potential subjects that do not have a total hip replacement operation (i.e. those with hip fracture surgery) will be excluded from the study (Table 1). The study will also maintain concentration on subjects that are given a fiber-enforced polymer composite implantation (2) as the replacement material for the hip (Table 1). There will be a

**Figure 1**



baseline for at home therapy and immediately after the operation, patients that are able to go home will be included in the subject pool. Following the few days after surgery, all subjects will begin a short-term period of at home rest, with therapy beginning 2 days after returning home. It is after that initial time period that the subjects will then be assigned into their rehab groups (Figure 1). The group of subjects that will be given at home instructions for therapy, with no physical therapist facilitating exercises, will be considered the control group. These subjects will be shown the rehab exercises with a verbal explanation and will be completing the exercises on their own.

It is this test group that will be the one to elect to do the exercises on their own. After this group is voluntarily assigned, the other two rehabilitation groups will be randomly assigned. The remaining subjects will either be divided into the at home care group (those that will receive administration in their homes) or the outpatient clinic group (those that will travel to the rehab center and be administered therapy there). In the rehab center, the subject will be isolated from any other patients as to decrease the factor of being psychologically motivated by other patients. Therefore, by maintaining therapy with these three separate groups, it will be observed and recorded which group responds to therapy more effectively and efficiently. The three groups will either be assigned or administered the same exercises, and will be monitored to adjust the exercises relative to the subject's progression (Appendix 1).

The entire therapeutic process will be over the time span of a six-month period. This is not inclusive of the primary 2-day period and begins on relative terms to each of the subjects individually. Throughout each of the rehabilitation programs, the same exercises and techniques for therapy will be used cross study. An example of this program can be seen below. The program will begin with a 4-month initial period where the subjects will go through therapy three times a week. The final two months will have the subjects perform therapy twice a week. Throughout the entire time period, rest, ice and stretching/mobility will be encouraged during the "off

**Table 1: Criteria for Inclusion/Exclusion**

Inclusion Criteria	Exclusion Criteria
1. Total Hip Replacement Patient	1. Hip fracture patients
2. Polymer Composite Replacement	2. Patients undergoing any other treatment other than that provided by the study
3. Above the age of 65	3. Patients with any other material used for hip replacement beside polymer composite
4. Informed Consent Agreement	4. Any subjects utilizing HGH, or other PEDs.

periods” when subjects are not at or performing therapy. At the end of each month of the trial, an independent examiner will record measurements of hip range of motion using a goniometer as well as implementing the *Harris Hip Score* (Appendix 2) to maintain readings on functionality. This Score will allow the progression to be seen throughout the rehabilitation program. A final score will be taken one year after the beginning of the rehab trial as well. Additionally, the ability and progression to return to daily life tasks will be measured through a series of tests that will monitor the capability to be self-sufficient. These will include a timed six-minute walk (monitored on a treadmill), sit-to-stands, single leg stance balance, and stair step-ups (Appendix 3). The results of these tests will be recorded, upon ability, at the end of each month when the Harris Hip Score is taken. Fulfilling these tests show a good representation of tasks that are performed within the normal daily living for this particular population (7).

**Table 2: Variable Analysis**

Variable Name	1°, 2° Outcome variables?/ Covariate? Possible Confounder	Dependent/ Independent	Continuous/ Nominal/ordinal
Out Patient Therapy	Covariate: Activity level between therapy sessions, social support	Independent	Nominal
At Home Care	Covariate: Activity levels between therapy sessions, social support	Independent	Nominal
At Home Instructions	Covariate: Activity levels between therapy sessions, social support	Independent (Control)	Nominal
Time	Covariate: Patient determination/self dismissal	Independent	Continuous
Hip Score	Covariate: Activity levels between therapy sessions, social support	Dependent	Continuous

The information produced from the hip score will provide comparable results for the three rehabilitation groups. The hip score will be assessed based on the hip score that is set on a 100-point scale (8,10). Time will be focused and logged throughout the study, however, once a score of 80 or higher, which denotes a “good score” (8) is reached, that therapy will continue, but will at that point be considered a success. If a score of 80 is not met within the time period of this trial then the results will still be recorded and assessed to determine if a score of 70, which denotes “fair” (8,10) is reached. The main focus of this study, as stated above, is based on range of motion/daily activity abilities as well as time it takes to achieve a quality mobility score. Therefore, as range of motion and daily activities are logged with the *Harris Hip Score* (Appendix 2), time will be monitored in relation to the overall score. Time will be logged throughout the entire study; however, the focus for time will be placed on how long it takes to receive a score of 80 or above.

This study is looking at the effects of the setting and administration of physical therapy for total hip replacement patients. Thus, the comparison of the three settings (at home instruction, at home care, and outpatient clinic), are being held up to the hip score of the patients. Covariates such as social support, or exercise external to the rehab are excluded from considerations. All subjects will be given recommended guidelines as to what activity is allowed outside of the therapy, but mobility outside of the daily living activities are not part of the considerations. If any subjects are to drop out of the study, their values on the hip score will be carried forward and used in the analysis of progression.

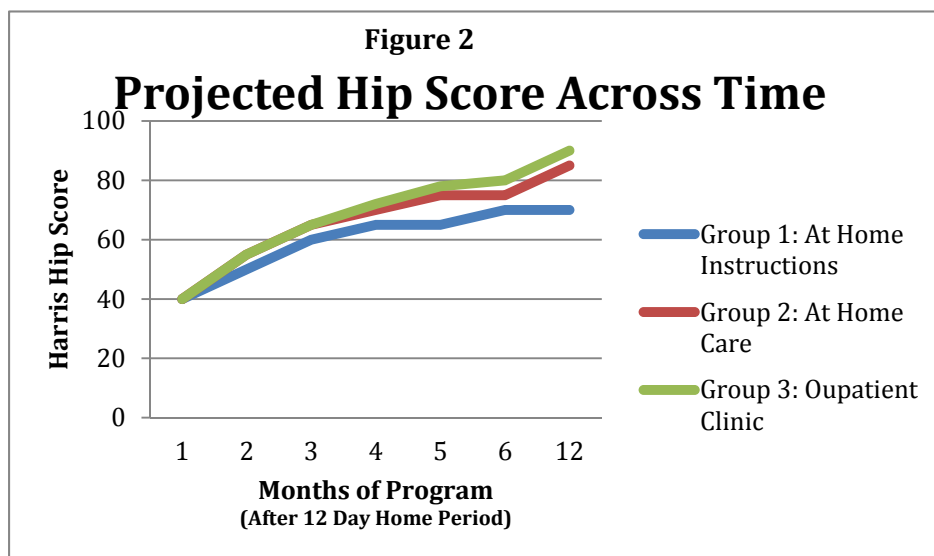
The comparison of hip scores amongst the three settings will be analyzed with the utilization of a two-way ANOVA test (with one repeated measure). The hip score of the three different subject groups will be compared over the progression of the test, with a two-way ANOVA test ran after the 6 month period and the 1 year time period. The two- way ANOVA test will be appropriate for this multi-group comparison and will nicely provide results that will become tangible. The test setting and administration will show to have influence on the

hip score that is taken throughout the study. Therefore, as stated previously, the initial dependent variable will be the hip score from the monthly evaluation, which is influenced by the physical therapy setting and administration (Table 2). Following the ANOVA test, a post-hoc test: the Tukey test, will be performed to assess the amount of time that it takes (in weeks) for each of the groups to reach the threshold average score of 80. If necessary, the mean threshold value can be reduced to 70 for the test and comparison. For both tests the P value will need to be  $<0.05$  to attain significance. Another factor that can be tested is the hip scores from each month in the study plotted along a time frame

### Expected Results:

Following this study there can be some firm predictions that may lead to suggestions for physical therapy recommendations after total hip replacement surgery. The expected outcome for the first specific aim would be that physical therapy administered by a licensed therapist would lead to a more beneficial recovery, thus a higher hip score, than by a patient following the rehab instructions (Figure 2). In turn, it is believed that physical therapy done at an outpatient clinic will result in a higher hip score over a shorter time compared to at home care (Figure 2). Reasoning behind the first aim includes the simple fact that when there is feedback and form correction during rehab it is typically thought as common knowledge to lead to higher gains compared to individual self-therapy. For the second aim reasoning, it is believed that having a patient get ready and find

transportation to the physical therapy clinic will help promote independence which will in turn increase the hip score further. Although the at home care and outpatient center will be relatively close, especially in comparison to the at home instruction, it is believed that being able to change settings will also help promote therapy recovery. Therefore, a higher hip score is expected in outpatient subjects in a shorter amount of time, displaying a more efficient use of rehabilitation (Figure 2). A similar trend is expected in the daily living activity tests (7).



Some potential problems or issues with this study would include external influences or activities outside of the therapeutic services. In other words, it would be difficult to monitor the daily lives of each of the subjects in comparison to others. A recommended guideline would be given to the subjects so that there wouldn't be any dramatic activities or exercises performed. It is also difficult to measure each subject's internal, or social motivation, which could also pose a difference in results. Nevertheless, the study should provide consistent results that should be able to be retested and found to be reliable. The hip score provided (Appendix 2) and the exercises that are to be used for therapy (Appendix 1) should provide valid tests and exercises to maximally attain an efficient and beneficial recovery program. This will also be displayed from the results in the daily activity tests (Appendix 3). This study is over a large amount of time, so it's important to keep the subject's going and emphasis on the post therapy improvements should definitely be made. Overall, the study is expected to provide beneficial results for future directions in physical therapy. This study could be taken further and exercise specific programs could be tested in terms of recovery. This study is just the first step into how to create an even more efficient form of physical therapy for a population that is growing in their need for rehabilitation services.

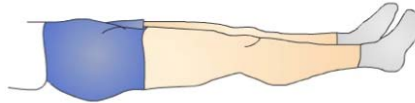
## Appendices:

Appendix 1: Exercises for rehabilitation, presented by the therapist administering. The same instructions are given to the at home self-care patients.

This section will explain some exercises that will help strengthen your leg and make your hip joint more flexible.

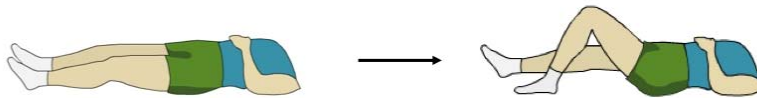
### *Hip Extension – Gluteal Set*

Lie down flat and squeeze your buttock muscles together without holding your breath. Hold together for 5-10 seconds; repeat 15-20 times.



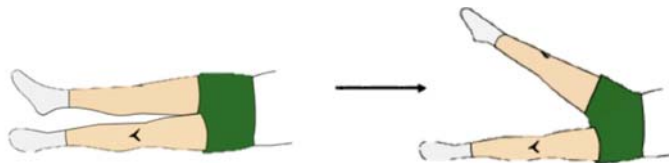
### *Knee & Hip Flexion*

While lying down flat, slide one heel at a time towards your body to a bent-knee position. Hold for 10-15 seconds; repeat 10-20 times.



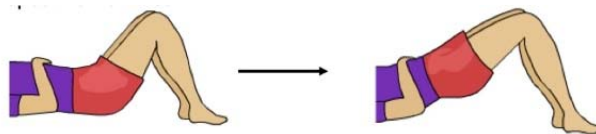
### *Hip Abduction & Adduction*

While lying down with the legs straight and together, slide each leg separately out and then back in, while keeping the knee straight and the toes pointed up. Hold for 1-2 seconds; repeat 10-20 times.



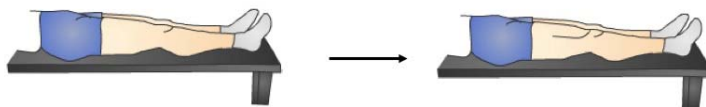
### *Hip Extension – Bridging*

While lying down with knees bent and feet flat, lift up the buttock and hold it for 5 seconds. Repeat 10-20 times.



### *Quadriceps Setting*

While lying on your back, keep your legs straight, together and flat down with your arms by your sides. Tighten the quads, one leg at a time, while pushing the back of your knee down. Hold for 5 seconds, then relax for 5 seconds. Repeat about 10 times for each leg. You can do several sets of this exercise a few times every hour, if you can manage any pain you have.



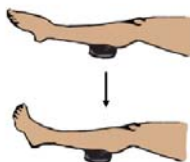
### *Terminal Knee Extension*

While lying down, place a pillow under your knees so that they are bent at a 30- or 40- degree angle. Straighten one leg at a time, hold it straight for about 5 seconds, then relax it slowly back to the initial position. Repeat 10-20 times, as much as you can manage pain.



### *Ankle - Exercise*

While lying down, place a towel under the calf so that the heel is raised up. First, point the foot toward the nose and hold it for 5-10 seconds, then point it down and hold again for 5-10 seconds. Repeat 15-20 times.





## Appendix 2: Harris Hip Score

<h1 style="margin: 0;">Harris Hip Score</h1>	<b>Hip ID:</b> _____
	<b>Study Hip:</b> <input type="checkbox"/> Left <input type="checkbox"/> Right
	<b>Examination Date (MM/DD/YY):</b> /    /
	<b>Subject Initials:</b>
<b>Medical Record Number:</b> _____	

**Interval:** \_\_\_\_\_

Harris Hip Score							
<p><b>Pain (check one)</b></p> <p><input type="checkbox"/> None or ignores it (44)</p> <p><input type="checkbox"/> Slight, occasional, no compromise in activities (40)</p> <p><input type="checkbox"/> Mild pain, no effect on average activities, rarely moderate pain with unusual activity; may take aspirin (30)</p> <p><input type="checkbox"/> Moderate Pain, tolerable but makes concession to pain. Some limitation of ordinary activity or work. May require Occasional pain medication stronger than aspirin (20)</p> <p><input type="checkbox"/> Marked pain, serious limitation of activities (10)</p> <p><input type="checkbox"/> Totally disabled, crippled, pain in bed, bedridden (0)</p> <p><b>Limp</b></p> <p><input type="checkbox"/> None (11)</p> <p><input type="checkbox"/> Slight (8)</p> <p><input type="checkbox"/> Moderate (5)</p> <p><input type="checkbox"/> Severe (0)</p> <p><b>Support</b></p> <p><input type="checkbox"/> None (11)</p> <p><input type="checkbox"/> Cane for long walks (7)</p> <p><input type="checkbox"/> Cane most of time (5)</p> <p><input type="checkbox"/> One crutch (3)</p> <p><input type="checkbox"/> Two canes (2)</p> <p><input type="checkbox"/> Two crutches or not able to walk (0)</p> <p><b>Distance Walked</b></p> <p><input type="checkbox"/> Unlimited (11)</p> <p><input type="checkbox"/> Six blocks (8)</p> <p><input type="checkbox"/> Two or three blocks (5)</p> <p><input type="checkbox"/> Indoors only (2)</p> <p><input type="checkbox"/> Bed and chair only (0)</p> <p><b>sitting</b></p> <p><input type="checkbox"/> Comfortably in ordinary chair for one hour (5)</p> <p><input type="checkbox"/> On a high chair for 30 minutes (3)</p> <p><input type="checkbox"/> Unable to sit comfortably in any chair (0)</p> <p><b>Enter public transportation</b></p> <p><input type="checkbox"/> Yes (1)</p> <p><input type="checkbox"/> No (0)</p>	<p><b>Stairs</b></p> <p><input type="checkbox"/> Normally without using a railing (4)</p> <p><input type="checkbox"/> Normally using a railing (2)</p> <p><input type="checkbox"/> In any manner (1)</p> <p><input type="checkbox"/> Unable to do stairs (0)</p> <p><b>Put on Shoes and Socks</b></p> <p><input type="checkbox"/> With ease (4)</p> <p><input type="checkbox"/> With difficulty (2)</p> <p><input type="checkbox"/> Unable (0)</p> <p><b>Absence of Deformity (All yes = 4; Less than 4 = 0)</b></p> <p>Less than 30° fixed flexion contracture    <input type="checkbox"/> Yes    <input type="checkbox"/> No</p> <p>Less than 10° fixed abduction    <input type="checkbox"/> Yes    <input type="checkbox"/> No</p> <p>Less than 10° fixed internal rotation in extension    <input type="checkbox"/> Yes    <input type="checkbox"/> No</p> <p>Limb length discrepancy less than 3.2 cm    <input type="checkbox"/> Yes    <input type="checkbox"/> No</p> <p><b>Range of Motion (*indicates normal)</b></p> <p>Flexion (*140°)    _____</p> <p>Abduction (*40°)    _____</p> <p>Adduction (*40°)    _____</p> <p>External Rotation (*40°)    _____</p> <p>Internal Rotation (*40°)    _____</p> <p style="text-align: center;"><b>Range of Motion Scale</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">211° - 300° (5)</td> <td style="width: 50%;">61° - 100 (2)</td> </tr> <tr> <td>161° - 210° (4)</td> <td>31° - 60° (1)</td> </tr> <tr> <td>101° - 160° (3)</td> <td>0° - 30° (0)</td> </tr> </table> <p><b>Range of Motion Score</b> _____</p> <p><b>Total Harris Hip Score</b> _____</p>	211° - 300° (5)	61° - 100 (2)	161° - 210° (4)	31° - 60° (1)	101° - 160° (3)	0° - 30° (0)
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161° - 210° (4)	31° - 60° (1)						
101° - 160° (3)	0° - 30° (0)						

## Appendix 3: Daily Activity Tests

**WALKING**

Start a walking program.

Duration 6 Minutes  
 Complete 1 Set  
 Perform 1 Time(s) a Day

**SIT TO STAND / STAND TO SIT**

Start by sitting in a chair. Next, raise up to standing without using your hands for support.

Repeat 10 Times  
 Hold 1 Second  
 Complete 1 Set  
 Perform 1 Time(s) a Day

**SINGLE LEG STANCE - SLS**

Stand on one leg and maintain your balance.

Repeat 1 Time  
 Hold 30 Seconds  
 Complete 1 Set  
 Perform 1 Time(s) a Day

**STEP UP**

While standing with both feet on the floor, step up a step with one leg. Return backward towards the floor leading with the same leg.

Repeat 15 Times  
 Hold 1 Second  
 Complete 1 Set  
 Perform 1 Time(s) a Day

**References:**

1. **Bang, Michael, Deyle, Gail.** Comparison of Supervised Exercise with and without Manual Physical Therapy for Patients With Shoulder Impingement Syndrome. *Journal of Orthopaedic and Sports Physical Therapy* 30: 126–137, 2000.
2. **Bougherara, Habiba, Bureau, Martin, Yahia, L'Hocine.** Bone remodeling in a new biomimetic polymer-composite hip stem. *Journal of Biomedical Materials Research* 92A: 164–174, 2010.
3. **Crawford RW, Murray DW.** Total hip replacement: indications for surgery and risk factors for failure. *Annals of the Rheumatic Diseases* 56: 455–457, 1997.
4. **Davis, Kenneth, Ritter, MA, Berend, ME, Meding, JB.** The Importance of Range of Motion after Total Hip Arthroplasty. *Clinical Orthopaedics and Related Research* 465: 180–184, 2007.
5. **De Pablo, Paola, Losina, Elena, Phillips, Charlotte, Fossel, Anne.** Determinants of discharge destination following elective total hip replacement. *Arthritis Care & Research* 51: 1009–1017, 2004.
6. **Herbold, JA, Bonistall, K, Walsh, MB.** Rehabilitation following total knee replacement, total hip replacement, and hip fracture: a case-controlled comparison. *Journal of Geriatric Physical Therapy* 34: 155–160, 2011.
7. **Judd D, Dennis D, Thomas A, Wolfe P, Dayton M, Stevens-Lapsley J.** Muscle strength and functional recovery during the first year after THA. *Clinical Orthopaedics and Related Research* 472: 654–664, 2014.
8. **Kavanagh, BF F, RH Jr.** Clinical and Roentgenographic Assessment of Total Hip Arthroplasty: A New Hip Score. *Clinical Orthopaedics and Related Research* 193: 133–140, 1985.
9. **Munin, MC, Selligman, K, Dew, MA, Quear, T.** Effect of rehabilitation site on functional recovery after hip fracture. *Archives of Physical Medicine and Rehabilitation* 86: 367–372, 2005.
10. **Nilsson, Anna B Ann.** Measures of Hip Function and Symptoms. *American College of Rheumatology* 63: 200–207, 2011.