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Inpatient Physical Therapy for a Patient with Dementia after Right Above Knee Amputation: A Case Report

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The patient signed an informed consent allowing the use of medical information and the photos for this report and received information on the Institution’s policies regarding the Health Insurance Portability and Accountability Act.

The author acknowledges Scott Andresen PT, BS for the supervision and assistance while collecting data and treating this patient and Mike Fillyaw PT, MS for assistance with conceptualizing the case report.
Abstract

Background and Purposes

A sarcoma is a cancer found in certain tissues such as muscle, fat, cartilage or bone. Some sarcomas require amputation in order to avoid further growth or metastasis. There is limited research on dementia involving motor planning impairments. Physical therapy exercises and activities are more difficult for a patient with poor motor planning compared with a healthy individual. The purpose of this case report is to describe the inpatient physical therapy management of a patient with motor planning deficits and a right above knee amputation.

Case Description

The patient was a pleasant 82 year old female status post right above knee amputation. Her general health status was good and she had a supportive family. She also had a diagnosis of dementia which caused short term memory and motor planning impairments. Her chief complaint was decreased functional mobility. She was transferred to a skilled nursing facility from an acute rehabilitation hospital four weeks post amputation.

Outcomes

The patient was able to meet most of her physical therapy goals at discharge. She was unable to perform a sit to stand transfer independently with a walker but she was able to improve slide board transfers to a modified independent level to allow discharge to an assisted living facility.

Discussion

The patient made good progress from initial to discharge. She was able to improve strength, range of motion and functional mobility and decrease pain sensation. Her comorbidities such as
immobility prior to surgery, age, dementia, and above knee amputation affected her from progressing to higher levels of functional mobility. Further research is recommended to explore optimal physical therapy intervention strategies for patients with motor planning deficits.

**Manuscript body word count = 3153**

**Background and Purpose**

Lower limb amputation is a procedure most commonly performed on patients who are diabetic or have peripheral vascular disease. Above the knee amputations comprises approximately 27% of lower limb amputations and its highest prevalence is among individuals above the age of 65. Other causes for above the knee amputations include infection, trauma or cancer.¹

A sarcoma is cancer in certain tissues such as muscle, fat, cartilage or bone.² Refer to Figure 1 for an example of a right femoral sarcoma. The main goals for treatment of a sarcoma are to prevent further growth or metastasis. The current most common treatment choice is limb sparing surgery, which involves removal of only the tumor and surrounding tissue and replacing removed tissue with an implant. Limb sparing surgery along with chemo and radiation therapy can save the limbs of about 90% of all extremity sarcoma cases.³ If limb sparing surgery is unsuccessful or not indicated then an amputation will be performed proximal to the site of the sarcoma. Both procedures have similar survival rates but limb sparing surgery results in higher independent functioning.⁴

There is limited research in the literature regarding dementia involving motor planning deficits and physical therapy. However based upon the interventions provided by physical therapy, which include education, mobility, functional training, wound healing, optimizing range
of motion and preventing contractures, it is believed that an individual who has an above knee amputation combined with motor planning deficits and short term memory loss will have some difficulty with these interventions.\(^5\)

I selected this patient (MC) as a case report because she was a highly motivated individual who had underlying motor planning deficits and a transfemoral amputation. I believe that this case will add to the body of knowledge of physical therapy because it is a very high amputation which may not allow prosthesis to fit. There is a chance that after treatment she can improve her independent functioning dramatically and I thought it would be interesting to document that progress. The purpose of this case report is to describe the inpatient physical therapy management of a patient following right above knee amputation with motor planning deficits.

**History/Systems Review**

MC was a pleasant 82 year old female status post right above knee amputation at approximately five inches below the inferior border of the greater trochanter. The decision for amputation was made to prevent metastasis after surgical removal of the sarcoma and chemotherapy was unsuccessful. The medical diagnosis for MC was ICD-9 code 897.3 Traumatic Amputation of Leg(s) (complete) (partial) unilateral at or above knee complicated.

Prior to the traumatic amputation, MC resided in an elderly living facility alone with frequent family member support and no stairs to enter. She had started to consider moving to an assisted living facility after surgery to receive assistance with daily activities. She has three daughters who live in the area and are very supportive. Her general health status was good. She was a non-smoker and non-drinker. Family history was positive for cancer on father’s side exact
MC was a poor historian at times due to impaired short term memory. Her medical history was relatively unremarkable up until this traumatic amputation due to a sarcoma in her thigh. Her main complaint was decreased functional mobility due to right transfemoral amputation.

MC was referred to a skilled nursing facility from an acute rehabilitation facility four weeks post amputation to receive inpatient rehabilitation. Physical therapy will address weakness, pain, swelling, skin breakdown, functional mobility, gait and transfer training, neuromuscular reeducation, patient education and safety.

The initial system review revealed the following resting vitals: heart rate 84, blood pressure 124/78, respiratory rate 16 and no edema. Integumentary System: Impaired, Musculoskeletal system: Impaired, Neuromuscular system impaired, Communication not impaired, Affect not impaired, cognition alert and oriented to person place and time. However, she has a diagnosis of mild dementia and her short term memory is impaired. No learning barriers. MC learns through pictures and practical demonstration. The patient and her family’s goals and outcomes are realistic based upon the severity of her medical condition. They all realize that she will be primarily using a wheelchair for mobility and plan for a discharge to an assisted living facility at a modified independent level in the wheelchair.

**Clinical Impression 1**

The primary problem for MC is the right transfemoral amputation which severely affects her functional mobility. Her dementia needs to be better understood because it may impede progress with functional activities and discharge planning. The plan for the examination procedure was to address all systems found to be impaired in the systems review. The
The integumentary system was impaired due to a recent surgical intervention. The plan to examine and monitor this impairment is to observe the wound healing process and collaborate with the skilled nursing staff to ensure adequate wound healing. The neuromuscular system was also impaired and the plan is to assess transfer ability with the Functional Independence Measure (FIM) and balance with the Berg Balance Scale (BBS). The musculoskeletal system was impaired. I plan to take goniometric measurements for any joint ranges of motion that are not within functional limits and perform manual muscle tests (MMTs) where indicated. Finally, I plan to assess pain because I believe that it is important to monitor all patients’ pain levels.

MC is a good candidate for a case report because she is very unique. She has significant comorbidities such as cognitive deficits and poor motor planning as well as a recent high above knee amputation. She is also very motivated to participate in all rehabilitation services and home exercises.

**Examination- Test and Measures**

Tests and measures were completed at admission to the facility and shortly before discharge from the facility to an assisted living facility. (Table 1) FIM scores were assessed during all treatment sessions and changes were reported to other rehabilitation personnel.

The FIM is a uniform system of measurement for disability and measures the amount of assistance an individual requires to complete activities of daily living. It is scored from zero to seven which ranges from the inability to complete the task with assistance to independent completion. It is has two subscales which are cognitive and motor. The FIM has construct validity and high test-retest reliability in patients aged 80 and older. The intraclass correlation coefficient (ICC) for the motor score was .9 which demonstrates excellent interrater reliability.
Hip range of motion (ROM) was assessed with a goniometer. Nussbaumer et al. reported that the measurement of hip ROM is reliable and valid. However, they found that the concurrent validity between a goniometer and an electromagnetic tracking system was not good for hip flexion, adduction and external rotation.

The BBS is a fourteen item scale designed to measure balance and indicate fall risk in some populations. (Appendix 1) Major, Fatone and Roth examined the validity and reliability of the BBS for in people with lower limb amputation. They discovered that the BBS is a valid and reliable instrument for assessing balance in patients who have had an amputation, but not for predicting falls.

MMT is a standardized method used by physical therapists for testing muscular strength. The grading system ranges from zero to five. A grade of zero represents no palpable muscle contraction and a grade of five represents normal strength or able to within strong resistance. A systematic review by Cuthbert and Goodheart found that MMT used on patients with neuromusculoskeletal dysfunction had good validity and reliability.

The Numeric Pain Scale is a scale that measures a patient’s perceived pain levels. The scale ranges from zero to ten. A score of zero indicates no pain and a score of ten indicates the worst pain imaginable. Young et al. discovered that the Numeric Pain Scale had a fair reliability and good validity. However, Herr, Spratt, Mobily and Richardson found that the Verbal Descriptor Scale is a better assessment tool for older adults with mild to moderate cognitive impairment.

Clinical Impression 2

Evaluation
Based upon the examination results there were a few areas of concern for MC. Otherwise her vitals were normal; communication and affect were not impaired. Cognitive impairments were mild with slight short term memory impairments. Cognitively MC was appropriate but demonstrates apprehension and poor motor planning with higher level functional activities such as sit to stand and squat pivot transfers using a rolling walker or bed railing. The wound on the right residual limb is a concern and is monitored by her surgeon and skilled nursing. I believe this wound is MC’s biggest challenge and if it heals properly her functioning will improve. Her strength and range of motion were relatively normal based upon her age and history. She needs to build up strength in order to make up for the right transfemoral amputation. After a surgery of this extent, she complains of minimal pain which is remarkable and encouraging for the future. Her transfer performance at initial was good especially based upon her cognitive deficits and poor motor planning. I believe that with practice she will be able to improve her ability to transfer modified independent on the FIM.

Her impairments include muscle weakness, decreased right hip ROM, poor motor planning, fair balance, short term memory deficits, amputation wound present on the right lower extremity and pain. These impairments cause difficulties with all functional activities such as transfers. She requires assistance with bed mobility and transfers and is unable to ambulate or hop any distances with two caregivers assisting. These functional limitations and impairments cause MC to live in a skilled nursing facility in order to meet her needs. This environment does not allow her to participate in community activities outside of the nursing home but she is able to frequently attend events and activities in the facility.

Her cognitive impairments, apprehension and poor motor planning highly affect her prognosis. There is a possibility that with transfer practice she will be able to perform all needed
transfers from a wheelchair to function with modified independence to discharge to an assisted living facility. Her primary diagnosis of an above knee amputation especially the location of the amputation leaving a short residual limb highly affects her prognosis. It is unclear whether there is a possibility of fitting prosthesis.

**Diagnosis**

The physical therapy practice pattern for MC is 4J: Impaired Gait, Locomotion and Balance and Impaired Motor Function Secondary to Lower Extremity Amputation. I chose 4J because the majority of impairments, functional limitations and disabilities are all directly related to amputation. Her motor planning deficit is not related to this diagnosis and is attributed to dementia.

**Prognosis**

MC’s prognosis is good, but is highly dependent upon progress with transfers out of the wheelchair and right residual limb wound healing status post above knee amputation. Her dementia affecting motor planning and short term memory highly impacts the prognosis. The patient’s day to day transfer performance was highly variable. One day she could perform a supine to sit transfer without assistance. The next day she was unable and required a step by step explanation of how to complete the transfer. The level of amputation is also a cause for concern and chance of fitting prosthesis is questionable at this time. This information is based upon my own limited clinical experience with patient’s status post amputation and my clinical instructor’s judgment.

**Plan of Care**
The plan of care for MC was to practice transfers and bed mobility as well as a strengthening and stretching program. Repetition and problem solving were a main focus with transfers to progress towards a modified independent level on the FIM due to her motor planning difficulties. Occupational therapy assisted with activities of daily living training such as toileting, dressing and bathing. The goals were based upon the family goals for discharge and impairments and functional limitations found during examination. (Table 2)

The discharge plan for MC was between returning to her home in a senior community or placement in an assisted living facility. The decision was made through collaboration with rehabilitation personnel, the patient and her family. She was discharged to an assisted living facility to receive assistance with medications and meals. She uses a wheelchair to mobilize and a slide board for transferring between surfaces.

**Intervention**

MC was scheduled to receive physical therapy every day on weekdays and once on weekends for approximately 30-45 minutes. The main components of interventions were repetition and problem solving due to MC’s cognitive deficits and motor planning difficulties. MC was asked to perform functional activities such as slide board transfers and bed mobility activities from different surfaces and directions. Each session, the patient was asked to perform all aspects of functional mobility as independently as possible and only received assistance when required.

**Coordination, communication and documentation**

MC was rehabilitated in a skilled nursing facility which has many different medical professionals on site. Physical therapy coordinated treatment with occupational therapy, skilled
nursing, speech therapy, dietary and a physician specializing in wound care. Skilled nursing and certified nursing assistants were communicated with regarding safe patient handling techniques and required level of assistance. MC was referred to a wheelchair professional that custom fit her for a wheelchair. Two interdisciplinary team meetings were held to discuss necessary patient care and to plan for her discharge from the facility. Daily notes and weekly assessments were completed for MC in order to keep up with her performance to follow progress and make changes when necessary.

**Patient related instruction**

MC was given and instructed in a home exercise program. (Appendix 2) She performed the exercises with supervision until she was able to continuously perform the exercises correctly. It then became an adjunct treatment to normal therapy sessions. She was educated in all transfer sequencing and residual limb contracture prevention. Contracture prevention was an education focus including the importance of attaining the prone position to stretch the soft tissue of the anterior thigh. MC was instructed to prevent contractures because she may be unable to reduce them after they have developed. A site visit was performed for the assisted living facility that MC was discharged to and equipment recommendations were given to both the patient and facility.

**Procedural Interventions**

Therapeutic Exercise: Therapeutic exercise is one of the key elements of programs designed to improve or restore an individual’s function or to prevent dysfunction. MC was provided with a written bed exercise program including quadriceps sets, glut sets, combined quadriceps and gluteal sets to improve sit to stand transfer ability, straight leg raises and bridging. (Appendix 2)
Additional exercises included long arc quads, wheelchair pushups, latissimus pull down exercises, and forward and backward hopping in parallel bars. (Figure 3) Another important exercise MC performed was dynamic reaching. She was encouraged to weight shift onto her residual limb and maintain balance while completing a task such as retrieving various items from her bedside table. MC also required core strengthening to promote higher functional mobility. Exercises included crunches, diagonal curl ups, supine pelvic tilts and supine bike with low abdominals. (Figure 3)

Therapeutic Activities: Transfer activities are a necessary component of treatment for patients because it allows them to change position, move from one surface to another and promote independence. MC was asked to perform many therapeutic activities throughout the day by all health care professionals. The focus during all therapeutic activity interventions was consistent demonstration of safety by MC. This was important because she was being treated by many different professionals with different skill levels. Therapeutic activities included bed mobility, supine to and from sitting, sit to and from standing, squat pivot transfers, stand pivot transfers and slide board transfers. MC received a practical demonstration and cueing for proper sequencing and safety when required during functional activities. These activities were practiced in different settings, transfer surfaces and directions to promote motor learning.

**Outcome**

MC was discharged from a skilled nursing facility to an assisted living facility shortly after reexamination. The initial and final examinations were conducted by the same student therapist to maximize reliability of testing. (Table 1) The final examination showed that MC met most of her physical therapy goals. She experienced difficulty throughout all treatment sessions
executing a sit to stand transfer without assistance. However, the assisted living facility she was
discharged to does not require her to be able to stand independently. She was able to reach a
modified independent level with a slide board to transfer in and out of the wheelchair. This
allowed for her discharge to the assisted living facility. She was extremely motivated to continue
with her home exercise program and will receive home health physical therapy at her new
location for further rehabilitation. This new setting will allow her to start reintegrating back into
the community. MC seemed satisfied with her outcome and was ready to progress to a more
independent living facility.

Discussion

MC made good progress during her inpatient rehabilitation. She was able to improve her
functional mobility from requiring assistance with all aspects of mobility to a modified
independent level with a slide board. It seems that combining strengthening exercises and
functional mobility training along with the treatments from the other healthcare professionals
helped assist with MC’s progress. She was able to improve her strength and functional mobility
and decrease pain from initial examination to final. Frederiks and Visagie reported that it is
vital to treat the patient as an individual and encourage social integration rather than only
focusing on impairments.

MC was unable to perform a sit to stand transfer without some level of assistance
throughout her rehabilitation. It is important to discuss comorbidities when discussing her
achievements in functional mobility. A study by Vogel reported that age and prior level of
functional mobility are prognostic indicators for gains in functional status post traumatic
amputation. She was immobile for months prior to amputation and was 82 years old. Therefore,
the prognosis was poor for higher levels of independent mobility such as stand step transfers and sit to stand transfers at this acute stage status post above knee amputation.

There is little information in the literature regarding dementia and motor planning deficits. It is apparent that these impairments were vital components of MC’s care and outcomes. Practical demonstration and constant repetition of functional mobility with variable task components seemed to help promote motor learning in MC. Further research on dementia and motor planning deficits should be conducted in order to discover the optimal intervention strategy for patients with these impairments.

Despite all of MC’s negative factors affecting her outcome, she also had many positive factors. She was highly motivated to participate in all therapy related activities and exercises. Her family was very supportive, visited frequently and sometimes would attend therapy sessions. She was of a healthy weight with no underlying health concerns besides the recent amputation.

In conclusion, patients with significant comorbidities who have an above knee amputation benefit from an acute inpatient rehabilitation to improve functional mobility and strength to promote a safe return back to community living.


   Accessed December 3, 2014


   Accessed December 3, 2014

14. Young IA, Cleland JA, Michener LA, Brown C. Reliability, Construct Validity, and Responsiveness of the Neck Disability Index, Patient-Specific Functional Scale, and


17. LaRaia N. Preventing Contractures. Amputee Coalition. 2011. Available at


### Tests and Measures

<table>
<thead>
<tr>
<th>Integumentary System</th>
<th>Initial Examination (Day 1)</th>
<th>Re-examination (Day 36)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All exposed areas besides right residual limb intact, right residual limb warm to touch, red color and serosanguineous drainage. Negative pressure wound dressing in place.</td>
<td>Negative pressure wound dressing discontinued. Wound is packed and covered every three days. Stump shrinker stocking in place similar to the image in Figure 2A. She has been fitted for a custom shrinker similar to Figure 2B which has been ordered. Possibility of fitting a prosthesis is still unknown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Musculoskeletal System</th>
<th>Bilateral upper extremity and left lower extremity ROM WFL</th>
<th>Bilateral upper extremity and left lower extremity ROM remain WFL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right residual limb ROM: hip flexion/extension 0-95° all other ROM WFL. Flexion measurement taken in supine, extension in left sidelying. MC requested not to lay prone for measurement.</td>
<td>Right residual limb ROM: hip flexion/extension 5-0-100°. Flexion measurement taken in supine, extension in sidelying.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROM</th>
<th>Upper extremities grossly 4/5.</th>
<th>Upper extremities remain grossly 4/5. Triceps, latissimus dorsi and pectoralis major 4+/5.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right residual limb tested to 3/5 due to acute healing process</td>
<td>Right residual limb tested to grossly 3+/5 due to continued wound healing.</td>
</tr>
<tr>
<td></td>
<td>Left lower extremity gluteus maximus, gluteus medius and tibialis anterior 3+/5.</td>
<td>Left lower extremity gluteus maximus, gluteus medius and tibialis anterior 4/5.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strength</th>
<th></th>
<th></th>
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<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuromuscular system</td>
<td>Upper abdominal strength fair</td>
<td>Lower abdominal strength poor</td>
</tr>
<tr>
<td>----------------------</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Balance</th>
<th>Seated static balance steady $&gt;30$ seconds</th>
<th>Dynamic seated balance unsteady requires upper extremity support</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Berg balance scale score $5/56$ indicating a high fall risk</td>
<td>Seated static balance normal $&gt;2$ minutes</td>
</tr>
<tr>
<td></td>
<td>Dynamic seated balance good $&gt;15$ seconds. Able to shift weight outside of base of support in both directions without upper extremity support.</td>
<td>Berg balance scale score $18/56$ indicating a high fall risk</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transfers based upon the Functional Independence Measure</th>
<th>Rolling left and right minimum assistance of $1$</th>
<th>Rolling left and right modified independent with use of bed rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolling left and right minimum assistance of $1$</td>
<td>Rolling left and right modified independent with use of bed rail</td>
<td>Rolling left and right modified independent with use of bed rail</td>
</tr>
<tr>
<td>Supine&lt;&gt;sit minimum assist of $1$</td>
<td>Supine&lt;&gt;sit supervision</td>
<td>Supine&lt;&gt;sit supervision</td>
</tr>
<tr>
<td>Sit&lt;&gt;stand moderate assistance of $2$ with rolling walker</td>
<td>Sit&lt;&gt;stand performance inconsistent contact guard assist of $1$ to minimum assist of $2$ with rolling walker</td>
<td>Sit&lt;&gt;stand performance inconsistent contact guard assist of $1$ to minimum assist of $2$ with rolling walker</td>
</tr>
<tr>
<td>Slide board transfer bed&lt;&gt;wheelchair moderate assistance of $1$</td>
<td>Slide board transfer bed&lt;&gt;wheelchair, wheelchair&lt;&gt;standard chair modified independent</td>
<td>Slide board transfer bed&lt;&gt;wheelchair, wheelchair&lt;&gt;standard chair modified independent</td>
</tr>
<tr>
<td>Squat pivot transfer bed&lt;&gt;commode moderate to maximum assistance of $1$</td>
<td>Squat pivot transfer bed&lt;&gt;commode supervision</td>
<td>Squat pivot transfer bed&lt;&gt;commode supervision</td>
</tr>
<tr>
<td>Unable to ambulate any distance at initial with maximum assistance of $2$ and rolling walker</td>
<td>Stand pivot transfer minimum assistance of $2$ with rolling walker</td>
<td>Stand pivot transfer minimum assistance of $2$ with rolling walker</td>
</tr>
<tr>
<td>Pain</td>
<td>1-2/10 on visual analog scale. MC describes as “phantom” pains in right little toe</td>
<td>Pain consistently 0/10 on the visual analog scale at rest and during activities.</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>

< > = to and from, ROM = range of motion, WFL = within functional limits
Table 2.

Short term and long term rehab goals set for MC.

<table>
<thead>
<tr>
<th>Short term goals 1 week</th>
<th>Long term goals 5 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 pain 0/10 at rest supine with mitigation</td>
<td>#1 supine&lt;&gt;sit transfer independent</td>
</tr>
<tr>
<td>#2 supine&lt;&gt;sit contact guard assist for safety</td>
<td>#2 squat pivot transfer bed&lt;&gt;WC and bed/WC to commode modified independent</td>
</tr>
<tr>
<td>#3 sit&lt;&gt;stand transfer min assist x2 standard walker</td>
<td>#3 sit&lt;&gt;stand with stand by assistance rolling walker</td>
</tr>
<tr>
<td>#4 slide board transfer with all skilled caregivers min/mod a x1 bed&lt;&gt;WC</td>
<td>#4 Discharge to assisted living facility with services</td>
</tr>
</tbody>
</table>

<> = to and from, WC = wheelchair
Figure 1. Image representing the sarcoma MC had removed which resulted in transfemoral amputation.

Figure 2.

Image A. Original stump shrinker stocking supplied to MC by her surgeon. This stocking was too large for MC and a custom stocking was required.

Image B. Custom fitting stump shrinker stocking ordered for MC to assist with possible future prosthesis fitting


A. **ARM - 6 Triceps Dip / Depression**

Feet on floor, hands on armrests, extend arms to lift buttocks from chair. While lifted, shrug then depress shoulders, lowering buttocks. Hold _____ seconds.

Repeat _____ times. Do _____ sessions per day.

B. **UE MULTI JOINT - 18 Sitting: Lat Pull Down Resistance Band (Active)**

Sit, straight arms raised. Against yellow resistance band, bend arms, pulling elbows down toward sides.

Complete _____ sets of _____ repetitions. Perform _____ sessions per day.

C. **BACK / TRUNK - 1 Pelvic Tilt**

Flatten back by tightening stomach muscles and tilting hips toward waist. Hold _____ seconds. Repeat _____ times. Do _____ sessions per day.

D. **BASIC PROGRAM: TFA - 8 Abdominal Crunch**

Tighten stomach muscles to tilt pelvis and flatten back. Raise head and shoulders, and slide fingers up thigh toward knee. Continue breathing normally.

Hold _____ seconds. Repeat _____ times. Do _____ sessions per day.

E. **LOWER TRUNK - 21 Bike With Lower Abdominals Isometric**

Alternate straightening slightly and bending legs in bike motion. Keep pelvis and back still. Do _____ times, _____ times per day.
Figure 3.

A. Wheelchair push up exercise. She was encouraged to frequently perform this exercise throughout the day for pressure relief and strengthening.

B. Latissimus pull down exercise. MC completed 3 sets of 10 repetitions frequently during treatment sessions. She was able to progress from yellow to green elastic band.

C. Pelvic tilts. This exercise helped MC learn to engage her low abdominal musculature.

D. Abdominal crunch. Exercise to strengthen upper abdominals to assist with transfers and bed mobility.

E. Bike with lower abdominals. Exercise to strengthen low abdominal musculature and pelvic stabilization.

F. Diagonal crunch. Exercise to strengthen oblique abdominal musculature.

MC= patient

Images available at:


All exercises were recommended to start with 3 sets of 10 repetitions per day and add sets as the exercise gets easier.

**Figure 4. Home Exercise Program.**

- **Heel slides:** Left Leg 3 sets of 10 repetitions. 2 times per day.
- **Quad sets:** Left leg 3 sets of 10 repetitions. 2 times per day.

---

**SOUND LOWER EXTREMITY - 4**  
**Straight Leg Raise**

Support residual limb. Tighten muscle on front of sound limb thigh, then lift leg _____ inches, keeping knee locked.  
 Hold _____ seconds. Repeat _____ times.  
 Do _____ sessions per day.

---

**BASIC PROGRAM: TFA - 9**  
**Bridging**

With sound knee bent and foot flat, tighten buttock muscles while lifting hips.  
 Hold _____ seconds. Repeat _____ times.  
 Do _____ sessions per day.
Images available at:


Appendix 1. Berg Balance Scale

GENERAL INSTRUCTIONS

Please document each task and/or give instructions as written. When scoring, please record the lowest response category that applies for each item.

In most items, the subject is asked to maintain a given position for a specific time. Progressively more points are deducted if:

- the time or distance requirements are not met
- the subject’s performance warrants supervision
- the subject touches an external support or receives assistance from the examiner

Subject should understand that they must maintain their balance while attempting the tasks. The choices of which leg to stand on or how far to reach are left to the subject. Poor judgment will adversely influence the performance and the scoring.

Equipment required for testing is a stopwatch or watch with a second hand, and a ruler or other indicator of 2, 5, and 10 inches. Chairs used during testing should be a reasonable height. Either a step or a stool of average step height may be used for item # 12.

Berg Balance Scale

SITTING TO STANDING

INSTRUCTIONS: Please stand up. Try not to use your hand for support.

( ) 4 able to stand without using hands and stabilize independently

( ) 3 able to stand independently using hands

( ) 2 able to stand using hands after several tries

( ) 1 needs minimal aid to stand or stabilize

( ) 0 needs moderate or maximal assist to stand

STANDING UNSUPPORTED

INSTRUCTIONS: Please stand for two minutes without holding on.
If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported. Proceed to item #4.

SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL

INSTRUCTIONS: Please sit with arms folded for 2 minutes.

STANDING TO SITTING

INSTRUCTIONS: Please sit down.
TRANSFERS

INSTRUCTIONS: Arrange chair(s) for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

( ) 4 able to transfer safely with minor use of hands
( ) 3 able to transfer safely definite need of hands
( ) 2 able to transfer with verbal cuing and/or supervision
( ) 1 needs one person to assist
( ) 0 needs two people to assist or supervise to be safe

STANDING UNSUPPORTED WITH EYES CLOSED

INSTRUCTIONS: Please close your eyes and stand still for 10 seconds.

( ) 4 able to stand 10 seconds safely
( ) 3 able to stand 10 seconds with supervision
( ) 2 able to stand 3 seconds
( ) 1 unable to keep eyes closed 3 seconds but stays safely
( ) 0 needs help to keep from falling

STANDING UNSUPPORTED WITH FEET TOGETHER

INSTRUCTIONS: Place your feet together and stand without holding on.

( ) 4 able to place feet together independently and stand 1 minute safely
( ) 3 able to place feet together independently and stand 1 minute with supervision
( ) 2 able to place feet together independently but unable to hold for 30 seconds
( ) 1 needs help to attain position but able to stand 15 seconds feet together
( ) 0 needs help to attain position and unable to hold for 15 seconds

Berg Balance Scale continued.....
REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING

INSTRUCTIONS: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at the end of fingertips when arm is at 90 degrees. Fingers should not touch the ruler while reaching forward. The recorded measure is the distance forward that the fingers reach while the subject is in the most forward lean position. When possible, ask subject to use both arms when reaching to avoid rotation of the trunk.)

( ) 4 can reach forward confidently 25 cm (10 inches)
( ) 3 can reach forward 12 cm (5 inches)
( ) 2 can reach forward 5 cm (2 inches)
( ) 1 reaches forward but needs supervision
( ) 0 loses balance while trying/requires external support

PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION

INSTRUCTIONS: Pick up the shoe/slipper, which is place in front of your feet.

( ) 4 able to pick up slipper safely and easily
( ) 3 able to pick up slipper but needs supervision
( ) 2 unable to pick up but reaches 2-5 cm (1-2 inches) from slipper and keeps balance independently
( ) 1 unable to pick up and needs supervision while trying
( ) 0 unable to try/needs assist to keep from losing balance or falling

TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING

INSTRUCTIONS: Turn to look directly behind you over toward the left shoulder. Repeat to the right. Examiner may pick an object to look at directly behind the subject to encourage a better twist turn.

( ) 4 looks behind from both sides and weight shifts well
( ) 3 looks behind one side only other side shows less weight shift
( ) 2 turns sideways only but maintains balance

( ) 1 needs supervision when turning

( ) 0 needs assist to keep from losing balance or falling

TURN 360 DEGREES

INSTRUCTIONS: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

( ) 4 able to turn 360 degrees safely in 4 seconds or less

( ) 3 able to turn 360 degrees safely one side only 4 seconds or less

( ) 2 able to turn 360 degrees safely but slowly

( ) 1 needs close supervision or verbal cuing

( ) 0 needs assistance while turning

PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED

INSTRUCTIONS: Place each foot alternately on the step/stool. Continue until each foot has touch the step/stool four times.

( ) 4 able to stand independently and safely and complete 8 steps in 20 seconds

( ) 3 able to stand independently and complete 8 steps in > 20 seconds

( ) 2 able to complete 4 steps without aid with supervision

( ) 1 able to complete > 2 steps needs minimal assist

( ) 0 needs assistance to keep from falling/unable to try

STANDING UNSUPPORTED ONE FOOT IN FRONT

INSTRUCTIONS: (DEMONSTRATE TO SUBJECT) Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot. (To score 3 points, the
length of the step should exceed the length of the other foot and the width of the stance should
approximate the subject’s normal stride width.)

( ) 4 able to place foot tandem independently and hold 30 seconds
( ) 3 able to place foot ahead independently and hold 30 seconds
( ) 2 able to take small step independently and hold 30 seconds
( ) 1 needs help to step but can hold 15 seconds
( ) 0 loses balance while stepping or standing

STANDING ON ONE LEG

INSTRUCTIONS: Stand on one leg as long as you can without holding on.

( ) 4 able to lift leg independently and hold > 10 seconds
( ) 3 able to lift leg independently and hold 5-10 seconds
( ) 2 able to lift leg independently and hold ≥ 3 seconds
( ) 1 tries to lift leg unable to hold 3 seconds but remains standing independently.
( ) 0 unable to try of needs assist to prevent fall

( ) TOTAL SCORE (Maximum = 56)

Berg Balance Scale available at geriatric toolkit.missouri.edu/Berg-Balance-Scale.doc.