

## Appendix S1a

### Independent Transfer Education

Learning how to properly perform a transfer is very important as transfers are used frequently and are needed to perform even very basic activities of daily living. Learning the proper techniques will help to keep you safe, prevent falls and prevent the development of upper extremity injuries.

A transfer is divided into three phases – the set up phase, flight phase and end phase. The set up phase is the longest portion of a transfer and involves the placement of your wheelchair and your body. Setting up the transfer correctly will make the flight and end phase of the transfer very easy. The flight phase of the transfer is the portion in which your body is being lifted and moved to the new surface. Finally, the end phase involves safely landing on the target surface and adjusting your body.

Please review the points below about each phase of the transfer.

#### ○ **General Tips to Reduce the Frequency of Falls and Injury**



Level Transfer

- Perform a level transfer whenever possible.
  - Look for alternative surfaces to transfer to, (not just the most convenient place) or adjust the height of the surface (if possible).  
*Example:* Adjust the height of your tub seat or bedside commode so you do not need to perform an uphill transfer everyday.
- Alternate which arm you use to push off with (Example: don't always use your right arm as your push off arm – alternate between left and right)

transfers.

- Try to make the transfer as easy as possible.



Transfer Board

**SET UP PHASE:** Position your chair and body properly for a safe and easy transfer.

#### ○ **Step 1: Position Your Chair**



Proper Chair Position

- Your chair should be as close to the surface you are transferring to as possible. (Ideally, the chair should be touching the surface.)
  - Shorter distance decreases the potential for falls
  - Decreases the amount of time you have a significant amount of weight on your arms

- Position your chair on a 20-45 deg angle between your chair and the surface.
  - This position will help to put your shoulder in the best alignment for the correct transfer position
- Put on your wheelchair brakes when you are happy with your position.
- **Step 2: Chair Set Up**
  - If you have an armrest or sideguards on your chair, take them out of the way before you transfer. (if possible)

- **Step 3: Feet and Body Positioning**
  - Place your feet in the most stable position (on the floor if possible) before you transfer. Even if you do not have control of your legs, putting them in the proper alignment will provide a small amount of support and stability.



Feet and Body Position

- Sit on the front 2/3rds of your chair (or close to the edge of the surface you are transferring from)

- **Step 4: Hand and Shoulder Positioning**
  - Place your hands in a stable position prior to the start of the transfer.
    - The hand that you will be pushing from is close to your body and holding onto a stable object.
    - Your other hand should be positioned close to where you intend to land. The angle between your arm and body should be approximately 45 degrees.
  - Use a handgrip, if possible
    - You can use the armrest on your chair, the edge of a mat table/bed, etc.
    - If no handgrip is available, place your hand flat on the surface you are transferring from.
      - Don't reach for a handgrip in a position that will make you unstable!



Best!



Try to Avoid



Proper Hand and Shoulder Position



Try to Avoid

**FLIGHT PHASE:** Movement from point A to point B. If you have taken time to set up the transfer properly, this will be very easy.

- Use the “head-hips” relationship
  - Move your head in the opposite direction that you want your hips to move. This makes the transfer easier and reduces the potential for falls.
- The flight should feel very smooth and well controlled



**Head Hips Relationship**

**END PHASE:** Gently landing on the target surface and adjust yourself to where you want to be seated.

- When you finish your transfer, you should feel that it was very smooth and well controlled.
- Both of your hands should be in contact with both surfaces at the end of the transfer



**End Phase**



## Appendix S1b

### Assisted Transfer Education

Learning how to properly perform transfers activities is very important as transfers are performed on a frequent basis throughout the day and are needed to perform even very basic activities of daily living. Learning the proper techniques will help to keep you safe, prevent falls and the development of upper extremity injuries. It is also very important to learn how to effectively work with a caregiver if you receive assistance during transfers.

A transfer is divided into three phases – the set up phase, flight phase and end phase. The set up phase is the longest portion of a transfer and involves the placement of your wheelchair, your body and getting your caregiver in the proper position. Setting up the transfer well will make the flight and end phase of the transfer very easy. The flight phase of the transfer is the portion in which your caregiver lifts your body and moves you to the new surface. Finally, the end phase involves safely landing on the target surface and adjusting your body.

Please review the points below about each phase of the transfer.

#### ○ **General Tips to Reduce the Frequency of Falls and Injury**

- Perform a level transfer whenever possible.
- Look for alternative surfaces to transfer to, (not just the most convenient place) or adjust the surface (if possible). Example: Adjust the height of your tub seat or bedside commode so you do not need to perform an uphill transfer everyday.
  - Alternate which arm you use to push off with (Example: don't always use your right arm as your push off arm – alternate between left and right)
  - Use a transfer board or other assistive technology if you have difficulty performing transfers.
  - Use a gait belt to give your caregiver a solid surface to provide assistance.
  - Try to make the transfer as easy as possible.



Level Transfer



Gait Belt



Transfer Board

**SET UP PHASE:** Position your chair and body properly for a safe and easy transfer.

○ **Step 1: Position Your Chair**



Position Your Chair

- Your chair should be as close to the surface you are transferring to as possible. (Ideally, the chair should be touching the surface.)
  - Shorter distance decreases the potential for falls
  - Decreases the amount of time you have a significant amount of weight on your arms
- Position your chair on a 20-45 deg. angle between your chair and the surface you are transferring to.
  - This position will help to put your shoulder in the best alignment for the correct transfer position.
- Put on your wheelchair brakes when you are happy with your position.

**Step 2: Chair Set Up**

- If you have an armrest or sideguards on your chair, take them out of the way before you transfer (if possible.)

○ **Step 3: Body Positioning**

- Place your feet in the most stable position (on the floor if possible) before you transfer. Even if you do not have control of your legs, putting them in the proper alignment will provide a small amount of support and stability.
- Sit on the front 2/3rds of your chair (or close to the edge of the surface you are transferring from.) If necessary your caregiver can assist you to scoot forward in your chair by moving one side of your body forward at a time.
  - Once you are properly positioned, make sure your caregiver provides support to you if you have trouble with balance.



Body Position

○ **Step 4: Hand and Arm Placement**

- Place your hands in a stable position prior to the start of the transfer.
  - The hand that you will be pushing from is close to your body and holding onto a stable object.
  - Your other hand should be positioned close to where you intend to land. The angle between your arm and body should be approximately 45 degrees.
- Use a handgrip, if possible
  - You can use the armrest on your chair, the edge of a mat table/bed, etc.
  - If no handgrip is available, place your hand flat on the surface you are transferring from.
    - Don't reach for a handgrip in a position that will make you unstable!



**Best!**



**Try to Avoid**



**Try to Avoid**

**Step 5: Caregiver Placement**

- Instruct your caregiver to:
  - Position her feet on either side of your feet
  - Squat down
  - Hold tightly onto gait belt
  - Tell your caregiver to keep her back straight and lift with her legs



**Caregiver Position**



**FLIGHT PHASE:** Movement from point A to point B. If you have taken time to set up the transfer properly, this will be very easy.

- Use the “head-hips” relationship
  - Move your head in the opposite direction that you want your hips to move. This makes the transfer easier and reduces the potential for falls.
  - Make sure your caregiver stays out of your way when trying to use the head hips relationship
- Make sure to clearly communicate with your caregiver and let her know when the movement should begin (counting 1, 2, 3 can help to assure everyone is on the same page.)
- The flight should feel very smooth and well controlled



**Head Hips Relationship**

**END PHASE:** Gently landing on the target surface and adjust yourself to where you want to be seated.

- When you finish your transfer, you should feel that it was very smooth and well controlled.
- Both of your hands should be in contact with both surfaces at the end of the transfer
- Make sure your caregiver properly positions you before letting go!



**End Phase**

## Appendix S2

### **Management of Fall Risk in Non-Community Ambulators Affected by Multiple Sclerosis**

Below are a list of exercises designed to improve the strength of your core (torso) muscles and help to improve your balance in a sitting position.

All of these exercises are performed in a sitting position. Please sit on a firm, stable surface and place your hands on either side of your legs. You can use your hands to assist with balance to start with but as you get stronger, try to put your hands in your lap during the exercises. Ideally, your back should not be supported.

You should have a friend or family member stand next to you to assure that you don't fall during the exercises.

Please start doing each exercise \_\_\_\_\_ times, \_\_\_\_\_ time(s) per day, \_\_\_\_\_ days per week.

After you exercise you should feel soreness in the muscles but not pain or extreme fatigue. Listen to your body! If you are feeling extreme fatigue, decrease the number of repetitions and/or reduce the number of days per week that you exercise. If you do not feel that the exercises are difficult, increase the number of repetitions performed (increase by 5 repetitions each week) or the number of times you exercise each day (max = 3 times per day).

If you have questions, please feel free to call Dr. Rice at 217-333-4650.

**Make sure you always have someone with you while you are performing your exercises to assure safety!!!**



**Warm-Up:** Before you start your exercise routine, be sure to perform a short warm-up to get your muscles ready to go.

**Round and Arch Spine:** Start by rounding your shoulders forward and then arch your back. Each time you arch your back counts as 1 repetition. Start with a small movement first and then try to go through a greater range of motion as your muscles warm up.



**Torso Rotations:** Gently twist your trunk first to the right, then the left. Each time you turn to the left counts as 1 repetition. Please note: if you have had a back surgery, check with your doctor about the safety of this exercise.



**Routine:**

**Pelvic Tilt:** Start out in neutral sitting position. Tilt your pelvis forward and then squeeze your abdominal muscles to pull your pelvis back. Each time you squeeze your abdominal muscles and pull backwards counts as 1 repetition.



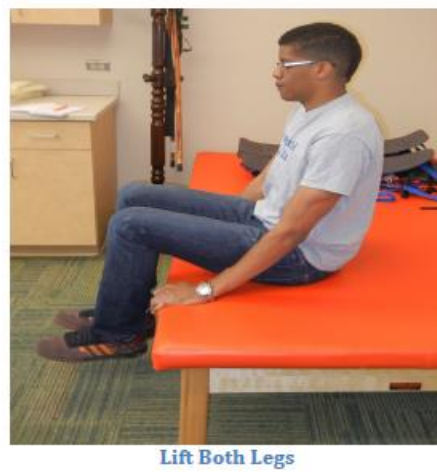
**Marching:** Lift your right foot off of the ground, as high as possible and then return your foot to the ground. Lift your left foot up, as high as possible, and return it to the ground. Each time you lift your left leg counts as 1 repetition.



**Challenge:** Twist your elbow to your opposite knee while marching.

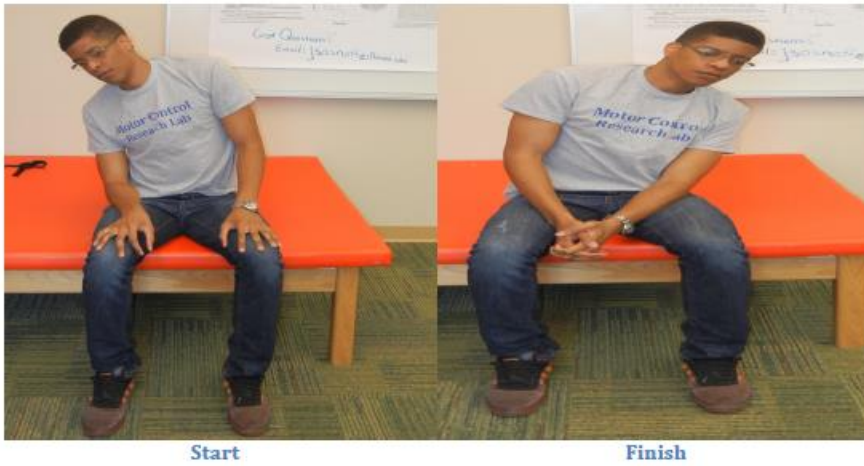


**Challenge 2:** Try to lift both feet off the ground at the same time.

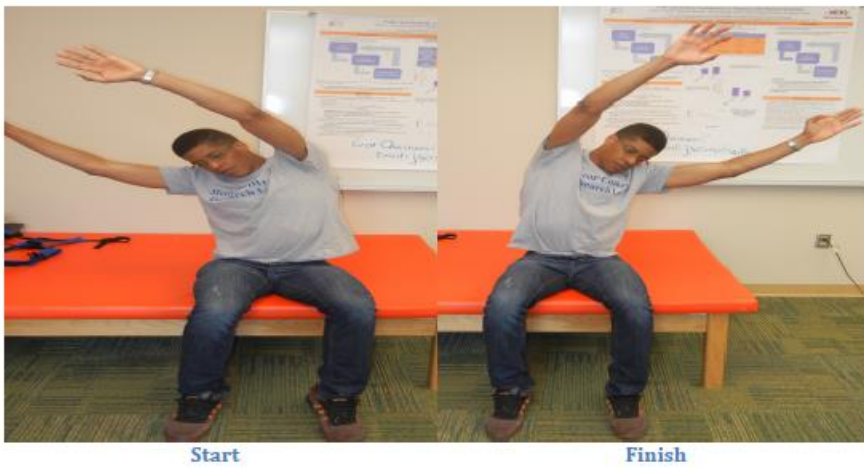




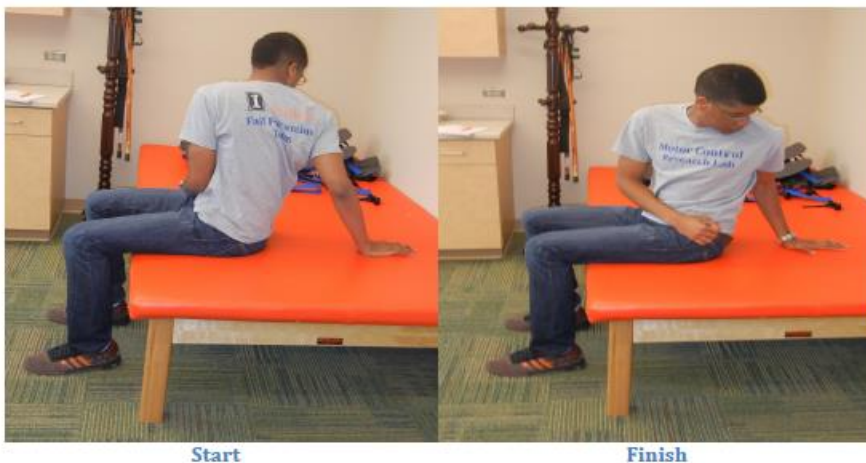
**Lateral Spinal Flexion:** While sitting, bend your body to the right side, then the left. Each time you bend to the left counts as 1 repetition.



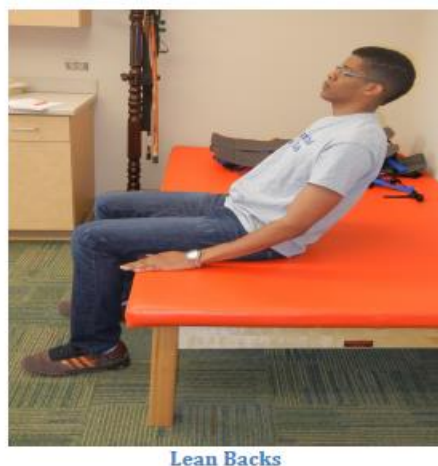
**Challenge:** Lift your arms over your head!



**Seated Torso Twist:** Reach behind your back to your right and then your left. Each time you turn toward the left counts as 1 repetition. If you have had a back surgery, consult with your physician prior to performing this exercise.



**Lean Backs:** Lean your body as far back as possible and return to an upright sitting position.



**Scapular Retraction:** Bend your elbows to 90 degrees; lift your arms approximately 6 inches away from the side of your body. Squeeze your shoulder blades together and hold for approximately 5 seconds each time.



**Scapular Retraction**

**Forward/Lateral Reach:** Reach forward, to the right and to the left. Each time you reach forward counts as 1 repetition.



**Reach Forward**

**Reach (Right) and Left**

**Challenge:** Don't hold onto the surface you are sitting on.



**Scout:** Scoot your bottom to the right 2 inches, backwards 2 inches, to the left 2 inches and forward 2 inches. (By the end, you will be back in the same position)  
Each time you scoot forward counts as 1 repetition.



**Scoot Right**

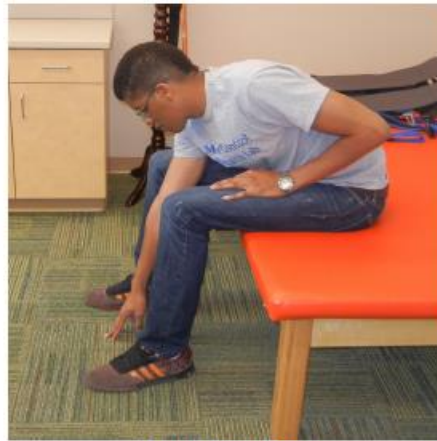
**Scoot Backward**



**Scoot Left**

**Scoot Forward**

**Touch Your Toes:** Bend over and touch your toes (or as close to your toes as possible).



**Touch Your Toes**

**Cool Down:** Finish up your exercise routine with a few stretches. This will help you to recover faster.

**Rotational Twists:** Gently twist to the right and hold for 5 seconds, twist to the left and hold for 5 seconds. Each time you twist to the left counts as 1 repetition.



**Start**

**Finish**

**Side Stretch:** Gently lean to your right side and hold for 5 seconds. Repeat on left.



**You are done!!**