Assessment Criteria and Care Plan for Safe Patient Handling and Movement

I. Patient's Level of Assistance:

_____ Independent— Patient performs task safely, with or without staff assistance, with or without assistive devices.
_____ Partial Assist—Patient requires no more help than standby, cueing, or coaxing, or caregiver is required to lift no more than 35 lbs of a patient's weight.
_____ Dependent—Patient requires nurse to lift more than 35 lbs of the patient's weight, or patient is unpredictable in the amount of assistance offered. In this case assistive devices should be used.

An assessment should be made prior to each task if the patient has varying level of ability to assist due to medical reasons, fatigue, medications, etc. When in doubt, assume the patient cannot assist with the transfer/repositioning.

II. Weight-Bearing Capability

_____ Full
_____ Partial
_____ None

III. Bilateral Upper-Extremity Strength

_____ Yes
_____ No

IV. Patient's level of cooperation and comprehension:

_____ Cooperative—may need prompting; able to follow simple commands.
_____ Unpredictable or varies (patient whose behavior changes frequently should be considered as unpredictable), not cooperative, or unable to follow simple commands.

V. Weight: _____ Height: _____
Body Mass Index (BMI) [needed if patient's weight is over 300 lbs][1]:_____
If BMI exceeds 50, institute Bariatric Algorithms

The presence of the following conditions are likely to affect the transfer/repositioning process and should be considered when identifying equipment and technique needed to move the patient.

VI. Check applicable conditions likely to affect transfer/repositioning techniques.

_____ Hip/Knee/Shoulder Replacements
_____ History of Falls
_____ Paralysis/Paresis
_____ Unstable Spine
_____ Severe Edema
_____ Very Fragile Skin
_____ Respiratory/Cardiac Compromise
_____ Wounds Affecting Transfer/Positioning
_____ Amputation
_____ Urinary/Fecal Stoma
_____ Contractures/Spasms
_____ Tubes (IV, Chest, etc.)
_____ Fractures
_____ Splints/Traction
_____ Severe Osteoporosis
_____ Severe Pain/Discomfort
_____ Postural Hypotension

Comments:_____
_____
_____

VII. Appropriate Lift/Transfer Devices Needed:

Vertical Lift: _____

_____

Horizontal Lift: _____

_____

Other Patient Handling Devices Needed:_____

_____

Sling Type: Seated_____ Seated (Amputee)_____ Standing_____ Supine_____ Ambulation_____ Limb Support_____

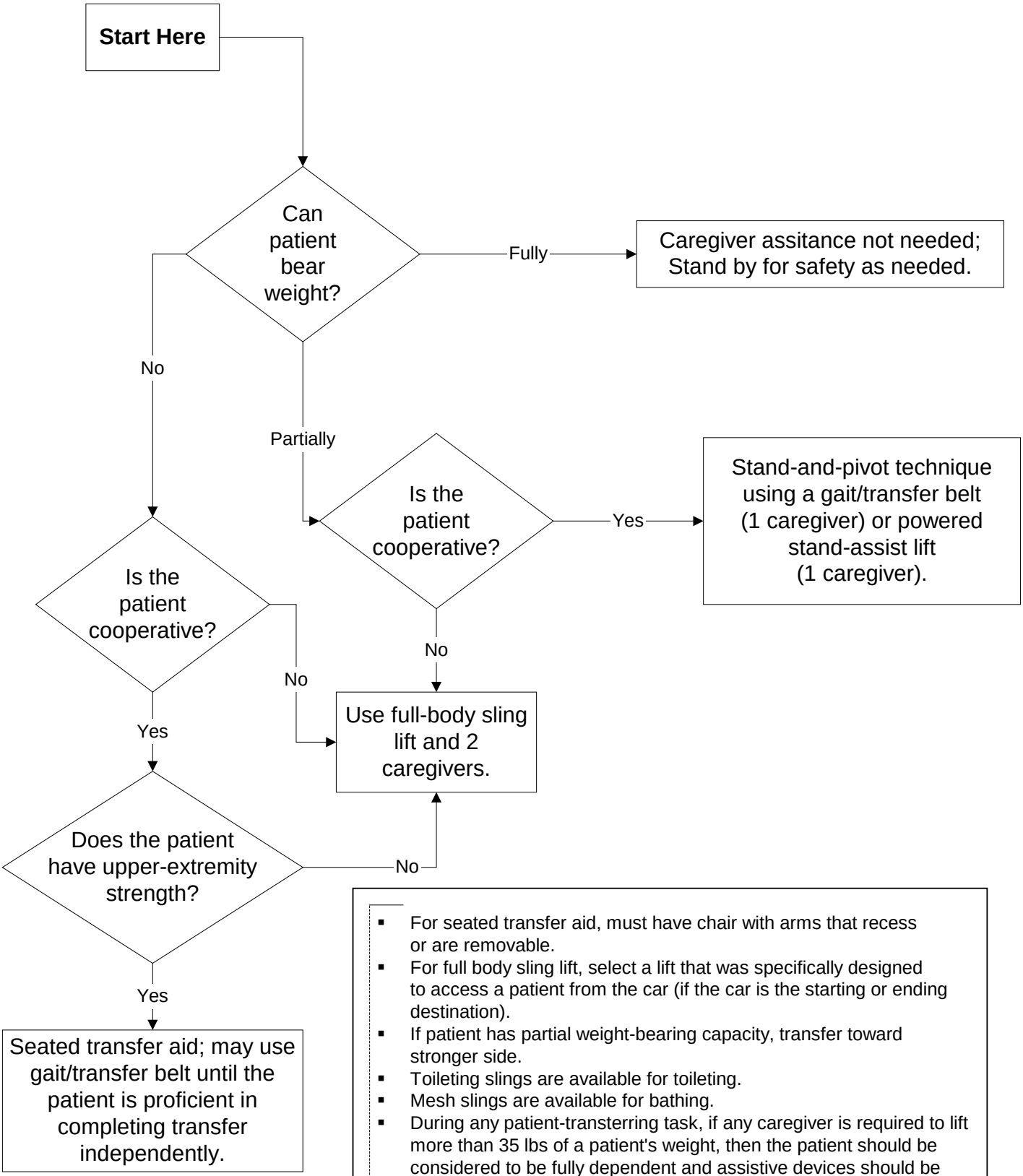
Sling Size: _____

Signature: _____ **Date:** _____

[1]If patient's weight is over 300 lbs, the BMI is needed. For Online BMI table and calculator see: http://www.nhlbi.nih.gov/guidelines/obesity/bmi_tbl.htm

Algorithm 1: Transfer to and From: Bed to Chair, Chair to Toilet, Chair to Chair, or Car to Chair

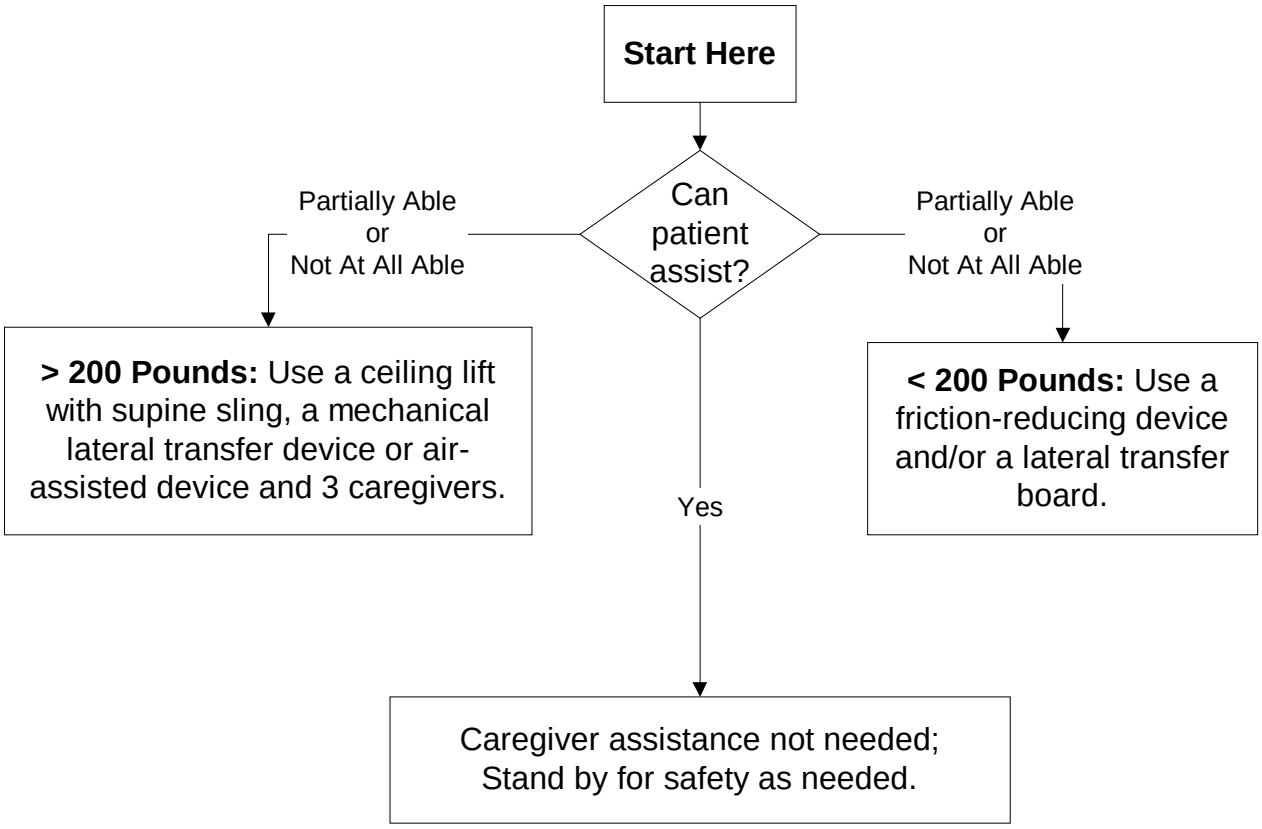
Last rev. 10/012008



- For seated transfer aid, must have chair with arms that recess or are removable.
- For full body sling lift, select a lift that was specifically designed to access a patient from the car (if the car is the starting or ending destination).
- If patient has partial weight-bearing capacity, transfer toward stronger side.
- Toileting slings are available for toileting.
- Mesh slings are available for bathing.
- During any patient-transterring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used for the transfer. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

Algorithm 2: Lateral Transfer To and From: Bed to Stretcher, Trolley

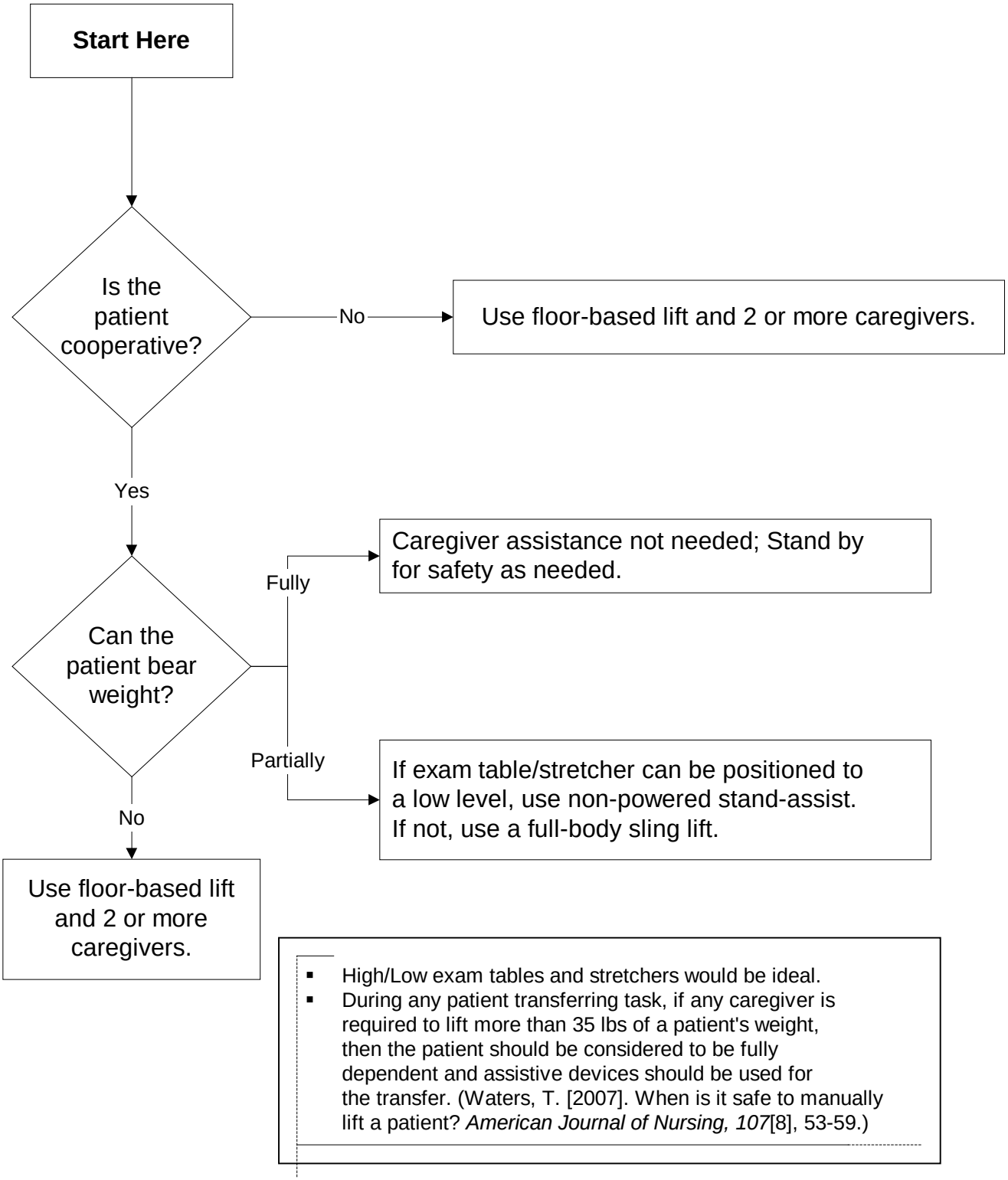
Last rev. 01/13/2009



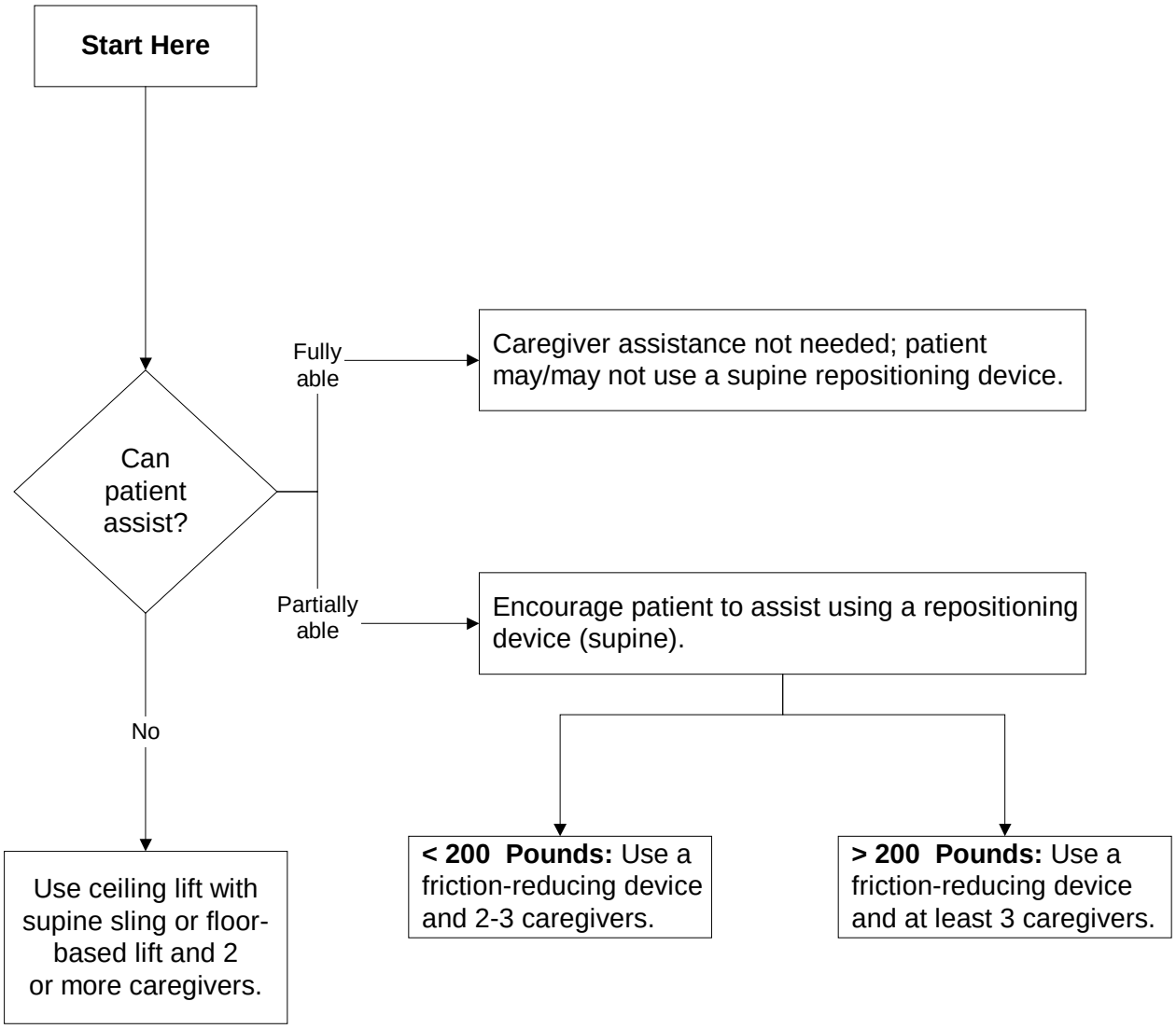
- Destination surface should be 1/2" lower for all lateral patient moves.
- For patients with Stage III or IV pressure ulcers, care must be taken to avoid shearing force.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then then patient should be considered to be fully dependent and assistive devices should be used for the transfer. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

Algorithm 3: Transfer To and From: Chair to Stretcher or Chair to Exam Table

Last rev. 10/01/08



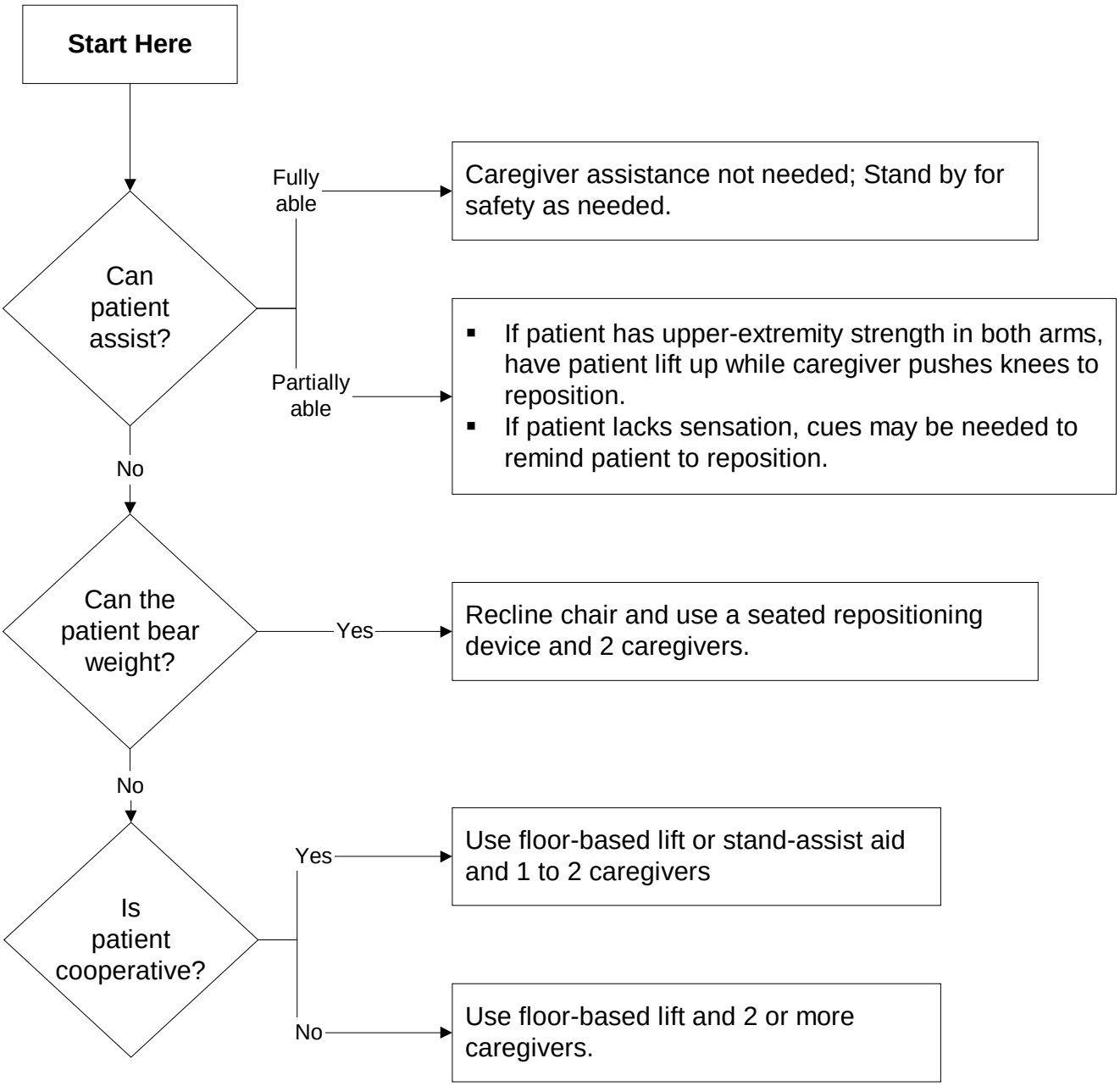
Algorithm 4: Reposition in Bed: Side-to-Side, Up in Bed
Last rev. 10/01/08



- This is not a one person task: DO NOT PULL FROM HEAD OF BED.
- When pulling a patient up in bed, the bed should be flat or in a Trendelenburg position (when tolerated) to aid in gravity, with the side rail down.
- For patients with Stage III or IV pressure ulcers, care should be taken to avoid shearing force.
- The height of the bed should be appropriate for staff safety (at the elbows).
- If the patient can assist when repositioning "up in bed," ask the patient to flex the knees and push on the count of three.
- During any patient handling task, if the caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

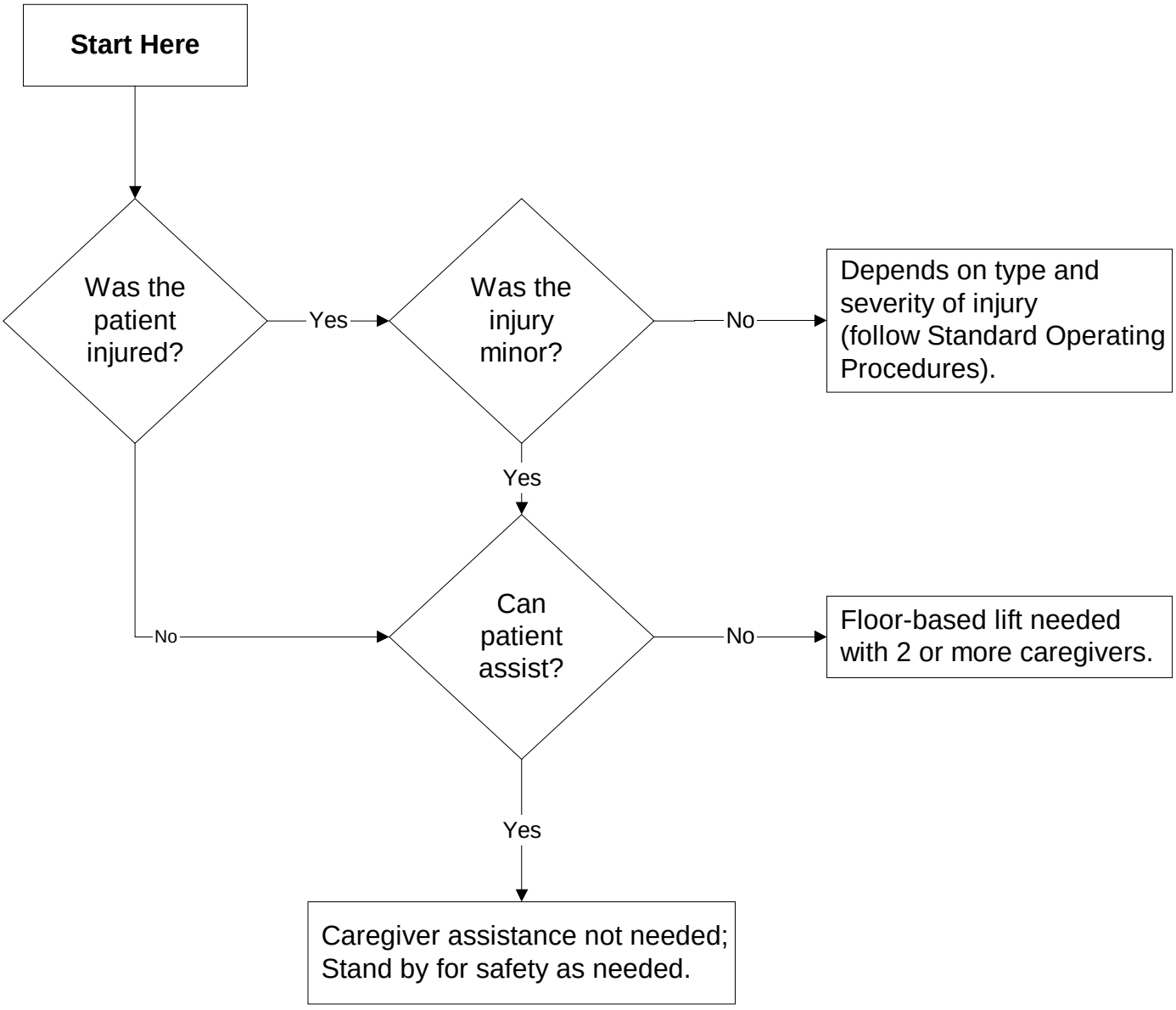
Algorithm 5: Reposition in Chair: Wheelchair and Dependency Chair

Last rev. 10/01/08



- Take full advantage of chair functions, e.g., chair that reclines, or use arm rest of chair to facilitate repositioning.
- Make sure the chair wheels are locked.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

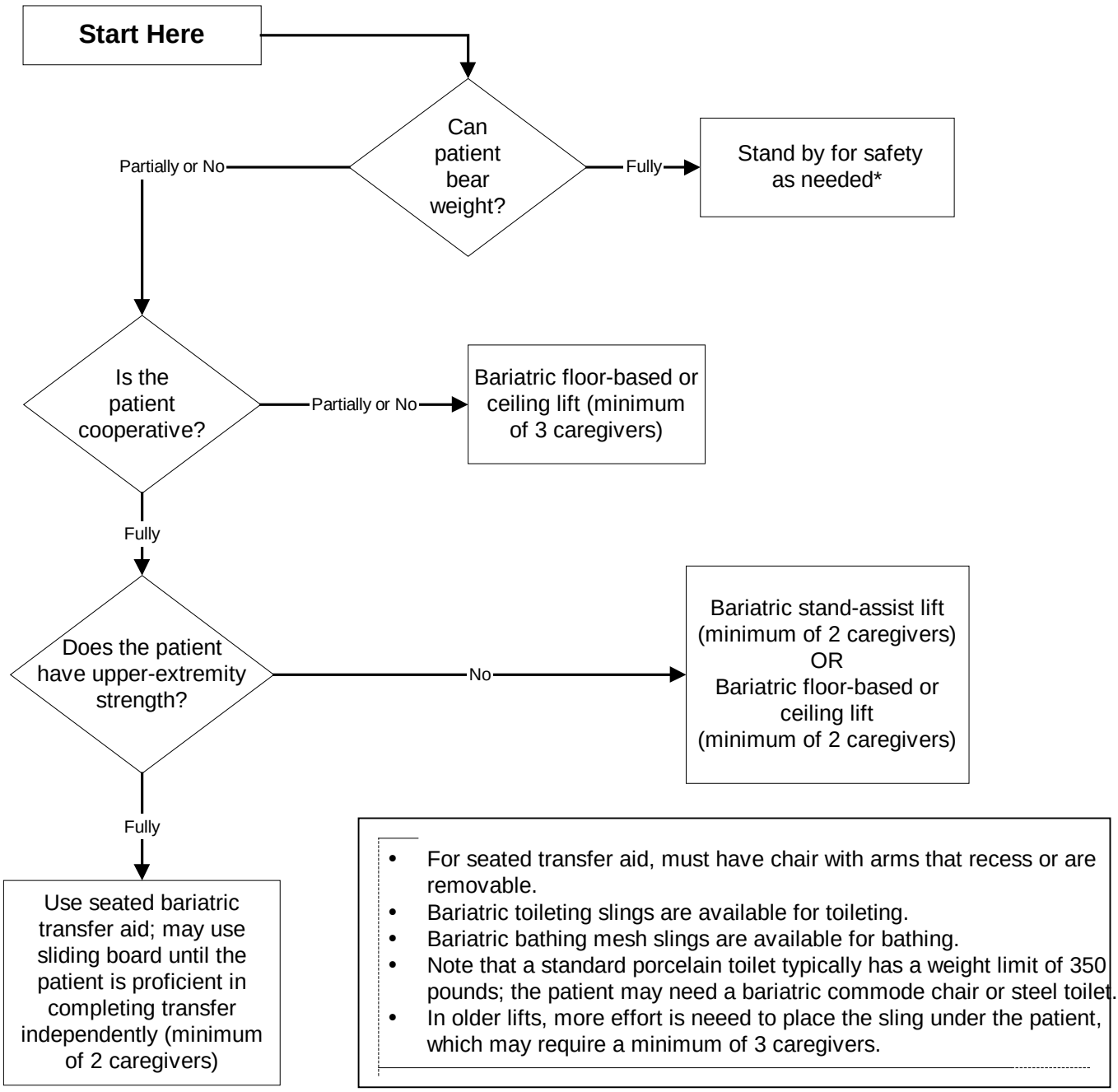
Algorithm 6: Transfer a Patient Up From the Floor
Last rev. 10/01/08



- Use floor-based lift that goes all the way down to the floor (most of the newer models are capable of this).
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

Bariatric Algorithm 1: Bariatric Transfer To and From: Bed/Chair, Chair/Toilet, or Chair/Chair

rev. 10/01/08

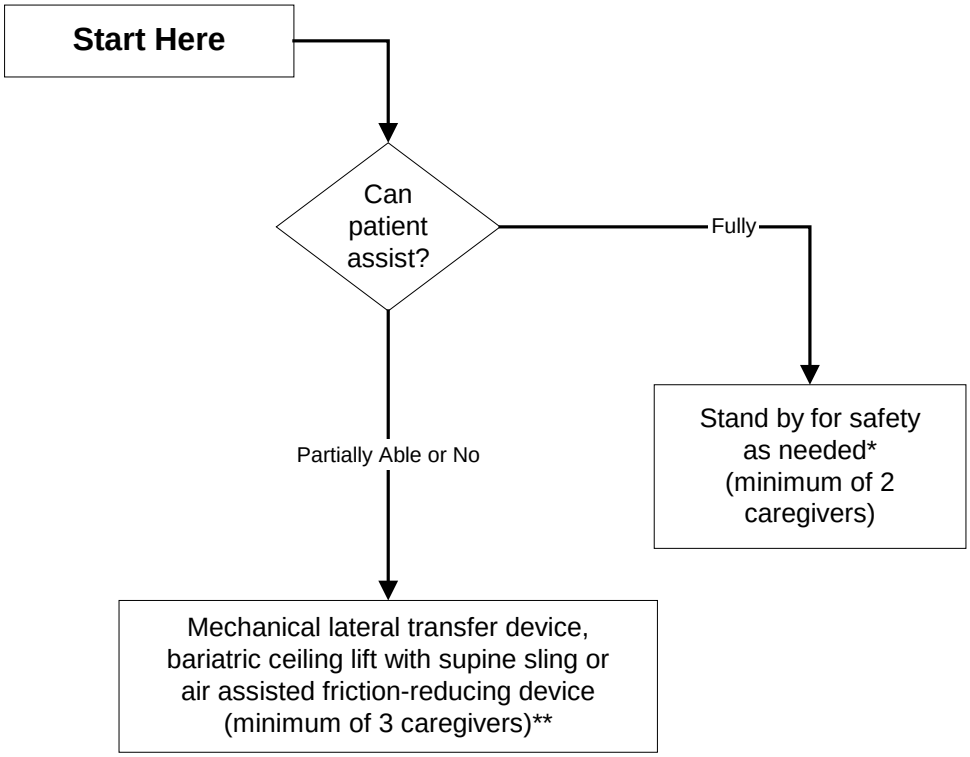


* "Stand by for safety." In most cases, if a bariatric patient is about to fall, there is very little that the caregiver can do to prevent the fall. The caregiver should be prepared to move any items out of the way that could cause injury, try to protect the patient's head from striking any objects or the floor and seek assistance as needed once the person has fallen.

- If patient has partial weight-bearing capability, transfer toward stronger side.
- Consider using an abdominal binder if the patient's abdomen impairs a patient-handling task.
- Assure equipment used meets weight requirements. Standard equipment is generally limited to 250-350 lbs. Facilities should apply a sticker to all bariatric equipment with "EC" (for expanded capacity) and a space for the manufacturer's rated weight capacity for that particular equipment model.
- Identify a leader when performing tasks with multiple caregivers. This will assure that the task is synchronized for increased safety of the health care provider and the patient.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? American Journal of Nursing, 107[8], 53-59.)

Bariatric Algorithm 2: Bariatric Lateral Transfer To and From: Bed/Stretcher/Trolley

rev. 10/01/08



- The destination surface should be about 1/2" lower for all lateral patient moves.
- Avoid shearing force.
- Make sure bed is the right width, so excessive reaching by caregiver is not required.
- Lateral transfers should not be used with speciality beds that interfere with the transfer. In this case, use a bariatric ceiling lift with supine sling.
- Ensure bed or stretcher doesn't move with the weight of the patient transferring.

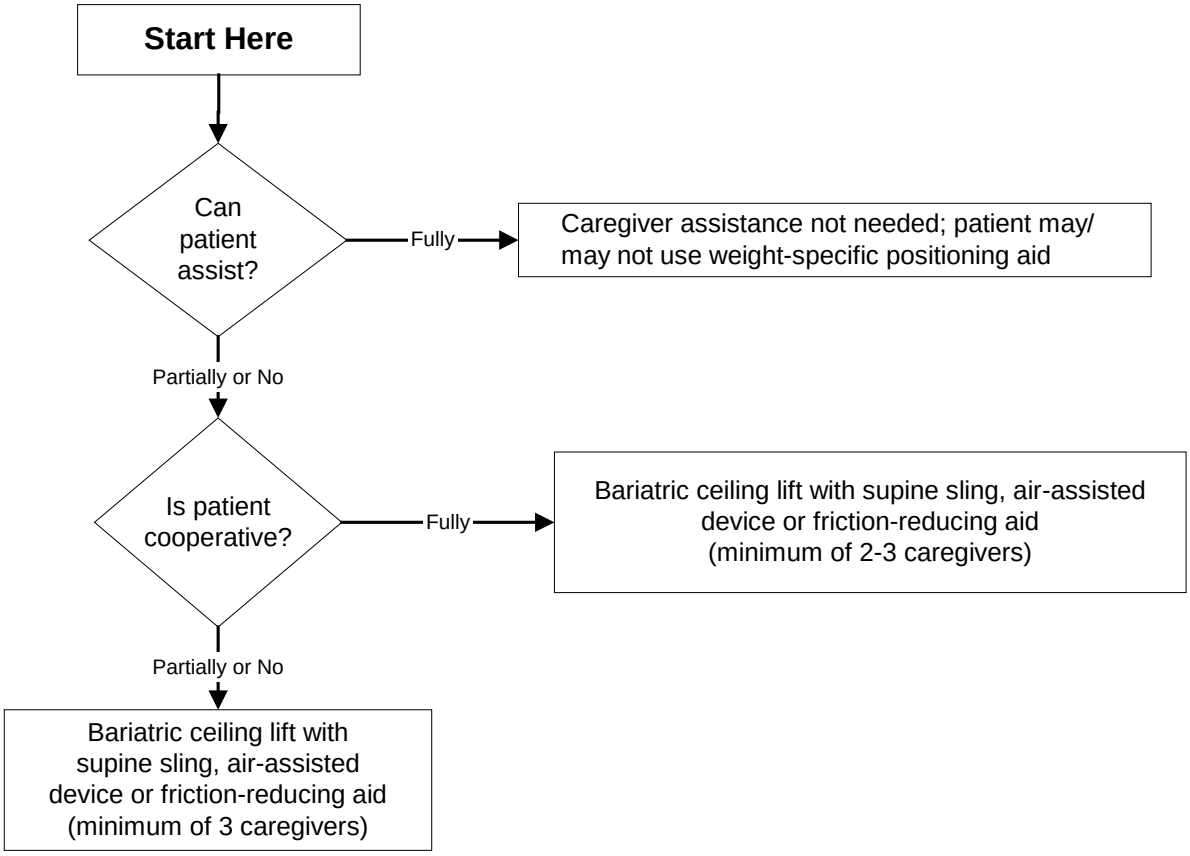
** Use a bariatric stretcher or trolley if patient exceeds weight capacity of traditional equipment.

* "Stand by for safety." In most cases, if a bariatric patient is about to fall, there is very little that the caregiver can do to prevent the fall. The caregiver should be prepared to move any items out of the way that could cause injury, try to protect the patient's head from striking any objects or the floor and seek assistance as needed once the person has fallen.

* Assure equipment used meets weight requirements. Standard equipment is generally limited to 250-350 lbs. Facilities should apply a sticker to all bariatric equipment with "EC" (for expanded capacity) and a space for the manufacturer's rated weight capacity for that particular equipment model.

- If patient has partial weight-bearing capability, transfer toward stronger side.
- Consider using an abdominal binder if the patient's abdomen impairs a patient-handling task.
- Identify a leader when performing tasks with multiple caregivers. This will assure that the task is synchronized for increased safety of the health care provider and the patient.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

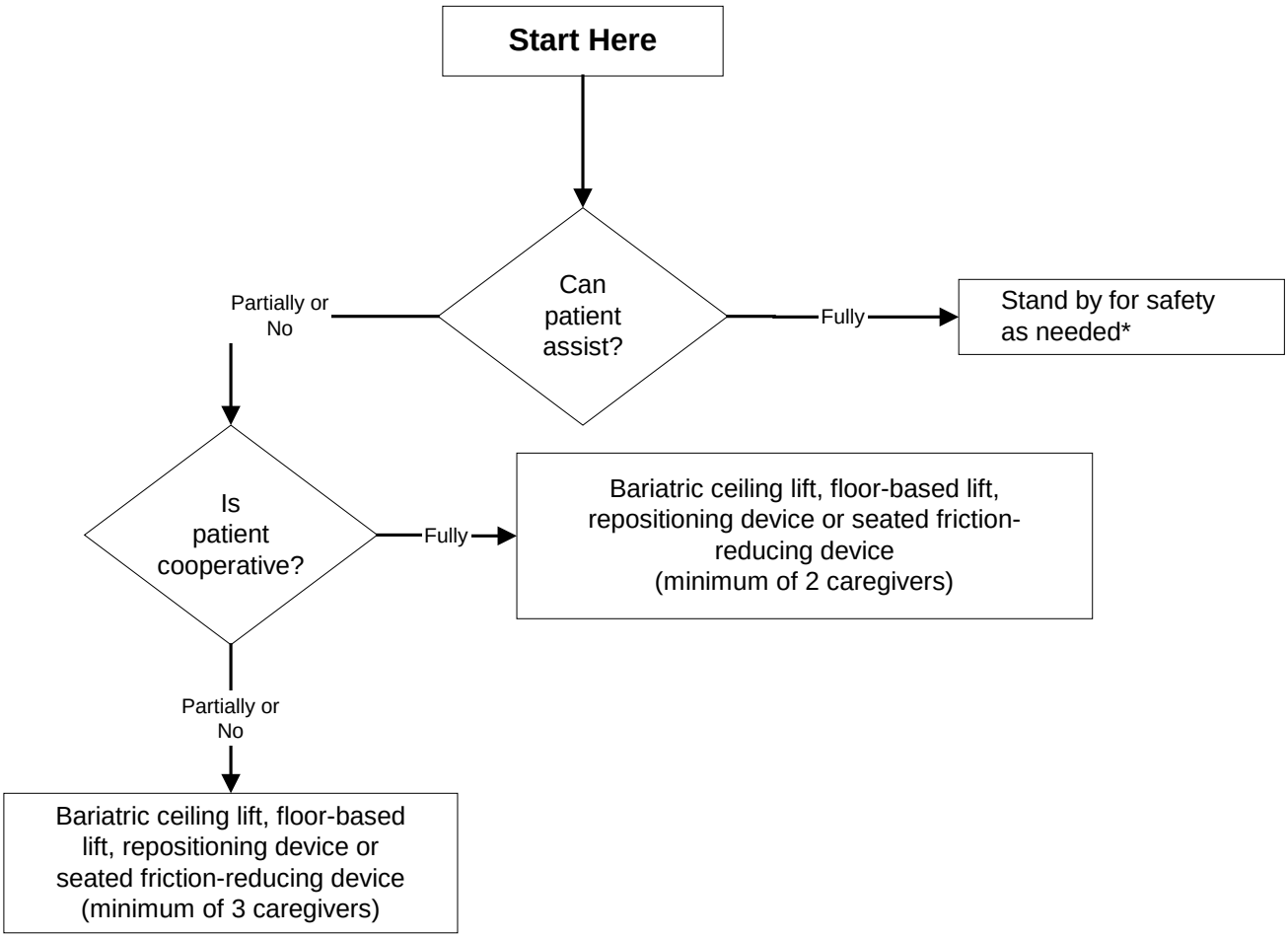
Bariatric Algorithm 3: Bariatric Reposition in Bed: Side-to-Side, Up in Bed
rev. 10/01/08



- When pulling a patient up in bed, place the bed flat or in a Trendelenburg position (if tolerated and not medically contraindicated) to aid in gravity; the side rail should be down.
- Avoid shearing force.
- Adjust the height of the bed to elbow height.
- Mobilize the patient as early as possible to avoid weakness resulting from bed rest. This will promote patient independence and reduce the number of high-risk tasks caregivers will provide.
- Consider leaving a friction-reducing device covered with drawsheet, under patient at all times to minimize risk to staff during transfers as long as it doesn't negate the pressure relief qualities of the mattress/overlay.
- Use a sealed, high-density, foam wedge to firmly reposition patient on side. Skid-resistant texture materials vary and come in set shapes and cut-your-own rolls. Examples include:
  - Dycem (TM)
  - Scoot-Guard (TM): antimicrobial; clean with soap and water, air dry.
  - Posey-Grip (TM): Posey-Grip does not hold when wet. Washable, reusable, air dry.

- If patient has partial weight-bearing capability, transfer toward stronger side.
- Consider using an abdominal binder if the patient's abdomen impairs a patient-handling task.
- Assure equipment used meets weight requirements. Standard equipment is generally limited to 250-350 lbs. Facilities should apply a sticker to all bariatric equipment with "EC" (for expanded capacity) and a space for the manufacturer's rated weight capacity for that particular equipment model.
- Identify a leader when performing tasks with multiple caregivers. This will assure that the task is synchronized for increased safety of the healthcare provider and the patient.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

Bariatric Algorithm 4: Bariatric Reposition in Chair: Wheelchair, Chair, or Dependency Chair
rev. 10/01/08



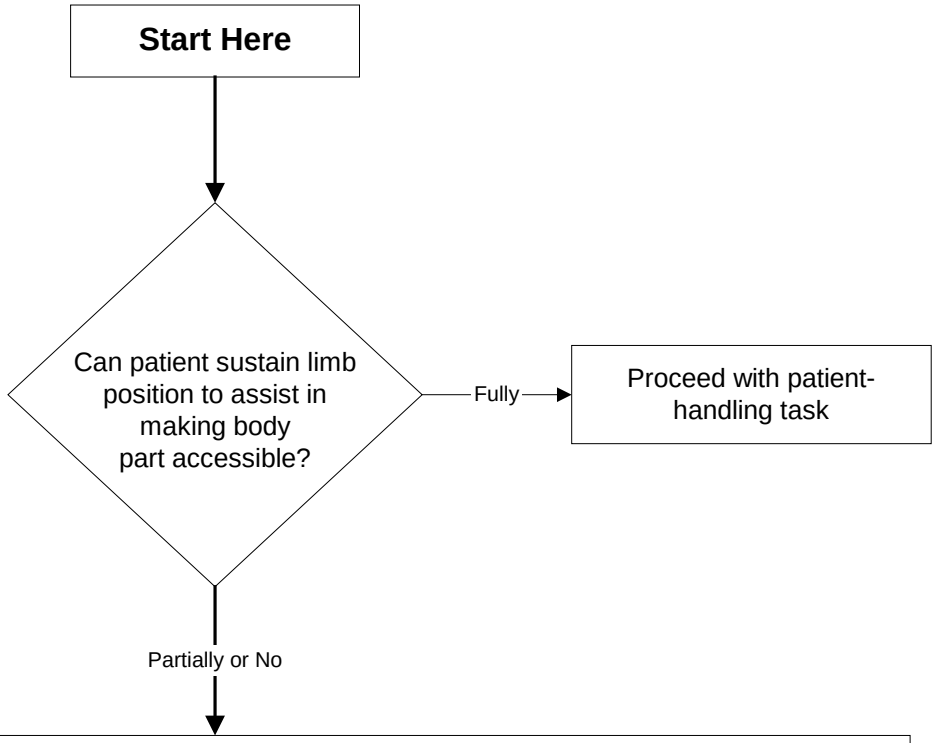
- Take full advantage of chair functions, e.g., chair that reclines, or use an arm rest of chair to facilitate repositioning.
- Make sure the chair wheels are locked.
- Consider leaving the sling under the patient at all times to minimize risk to staff during transfers after carefully considering skin risk to patient and the risk of removing/replacing the sling for subsequent moves.

* "Stand by for safety." In most cases, if a bariatric patient is about to fall, there is very little that the caregiver can do to prevent the fall. The caregiver should be prepared to move any items out of the way that could cause injury, try to protect the patient's head from striking any objects or the floor and seek assistance as needed once the person has fallen.

- If patient has partial weight-bearing capability, transfer toward stronger side.
- Consider using an abdominal binder if the patient's abdomen impairs a patient handling task.
- Assure equipment used meets weight requirements. Standard equipment is generally limited to 250-350 lbs. Facilities should apply a sticker to all bariatric equipment with "EC" (for expanded capacity) and a space for the manufacturer's rated weight capacity for that particular equipment model.
- Identify a leader when performing tasks with multiple caregivers. This will assure that the task is synchronized for increased safety of the healthcare provider and the patient.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

Bariatric Algorithm 5: Patient-Handling Tasks Requiring Access to Body Parts (Limb, Abdominal Mass, Gluteal Area)

rev. 10/01/08



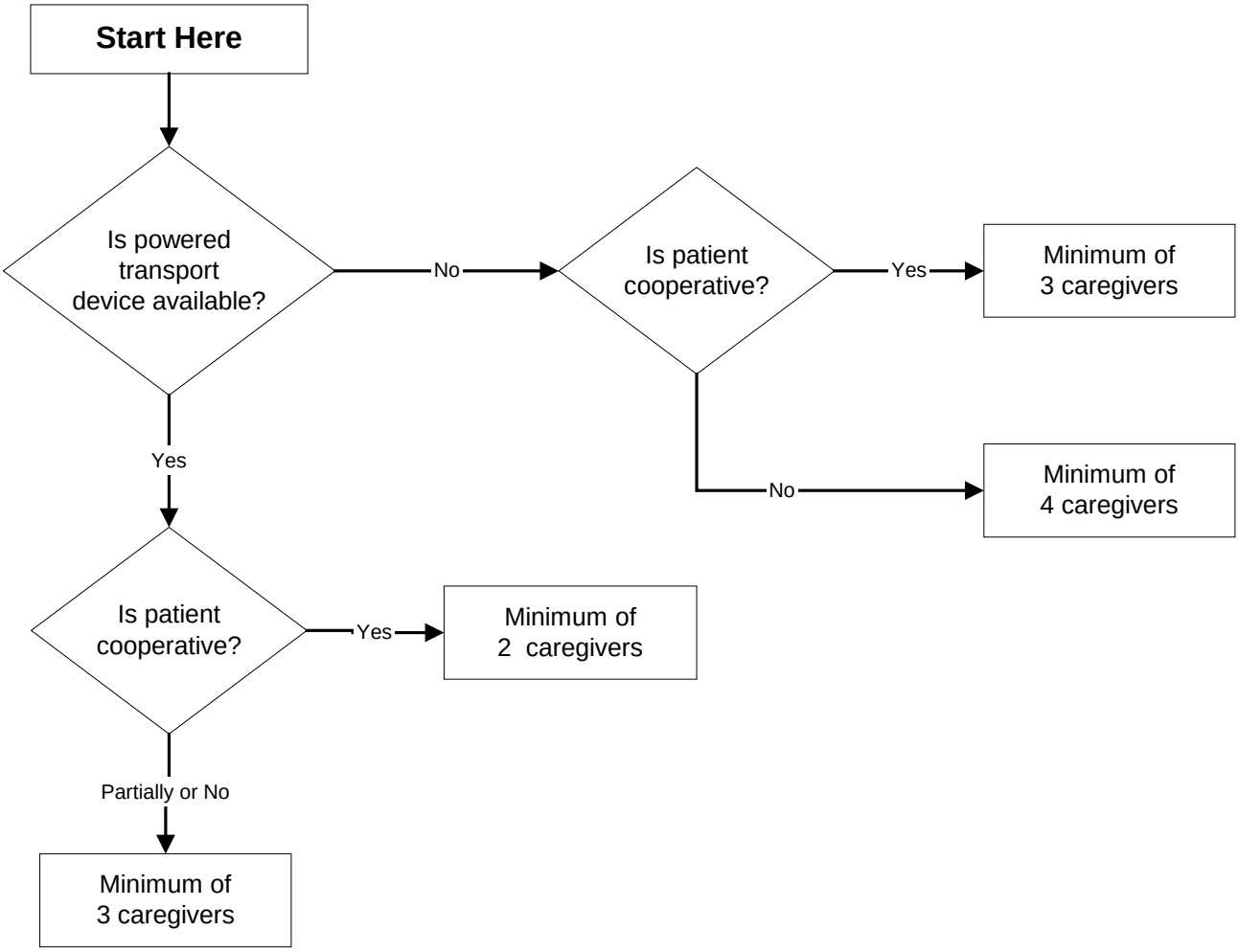
Assemble multidisciplinary team to develop creative solutions that are safe for patient and caregiver.

Examples:

- Modify use of a full body sling lift to elevate limbs for bathing or wound care (i.e. bariatric limb sling).
- Use draw sheet with handles for 2 caregivers (one per side) to elevate abdominal mass to access the perineal area (e.g., catheterization, wound care).
- To facilitate drying a patient between skin folds, use the air-assisted lateral transfer aid to blow air or use a hair dryer on a cool setting.
- Use sealed high-density foam wedge to firmly reposition patient on side. Skid-resistant texture materials vary and come in set shapes and cut-your-own rolls. Examples include:
  - Dycem(TM)
  - Scoot-Guard(TM): antimicrobial; clean with soap and water, air dry.
  - Posey-Grip(TM): Posey-Grip does not hold when wet. Washable, reusable, air dry.

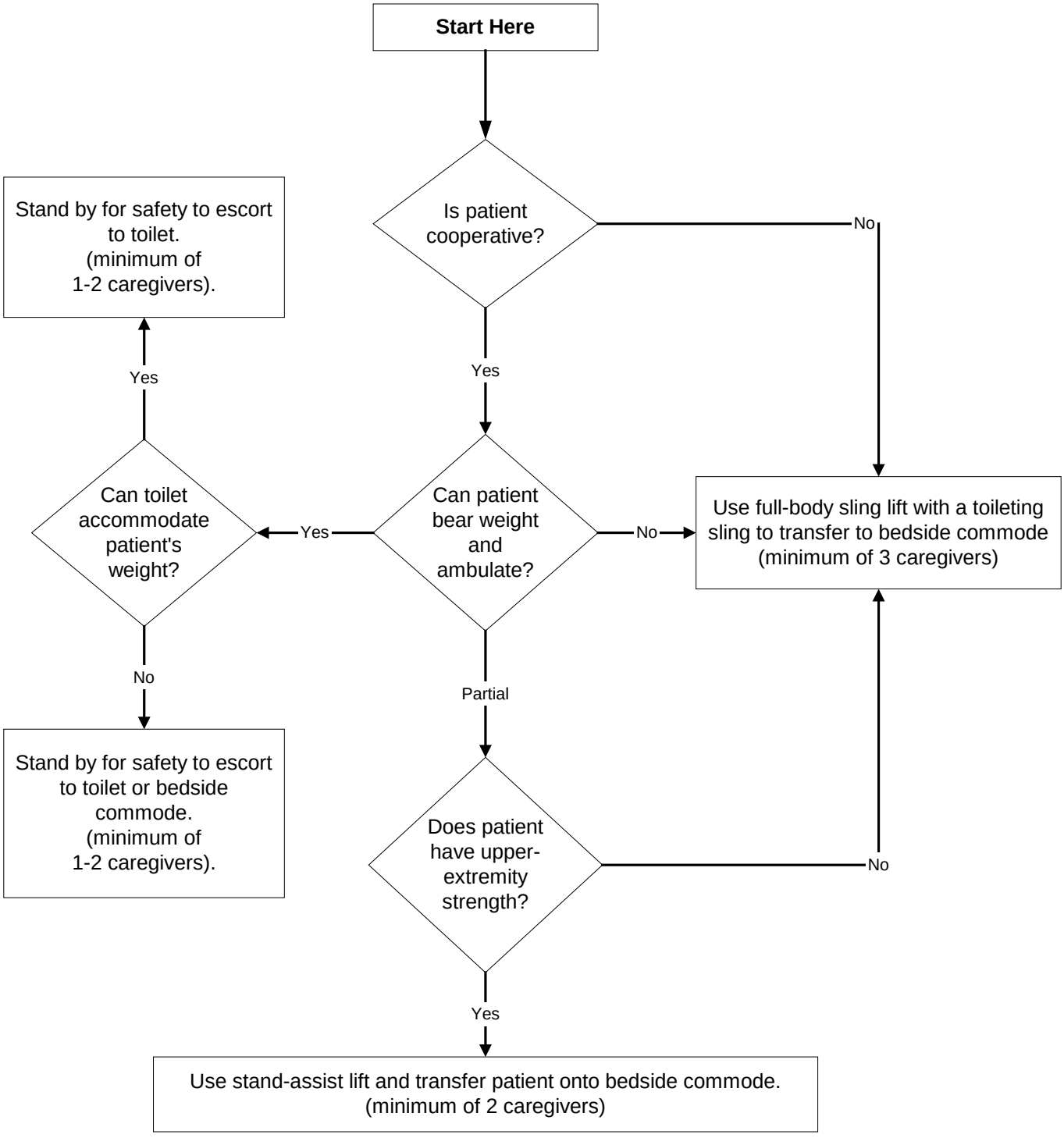
- A multidisciplinary team needs to problem solve these tasks, communicate to all caregivers, refine as needed and perform consistently.
- Consider using an abdominal binder if the patient's abdomen impairs a patient handling task.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

Bariatric Algorithm 6: Bariatric Transporting (Stretcher)
rev. 10/1/08



- If the patient has respiratory distress, the stretcher must have the capability of maintaining a high Fowler's position.
- Newer equipment often is easier to propel.
- If patient is uncooperative, secure patient in stretcher.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

Bariatric Algorithm 7: Toileting Tasks for the Bariatric Patient
rev. 10/01/098

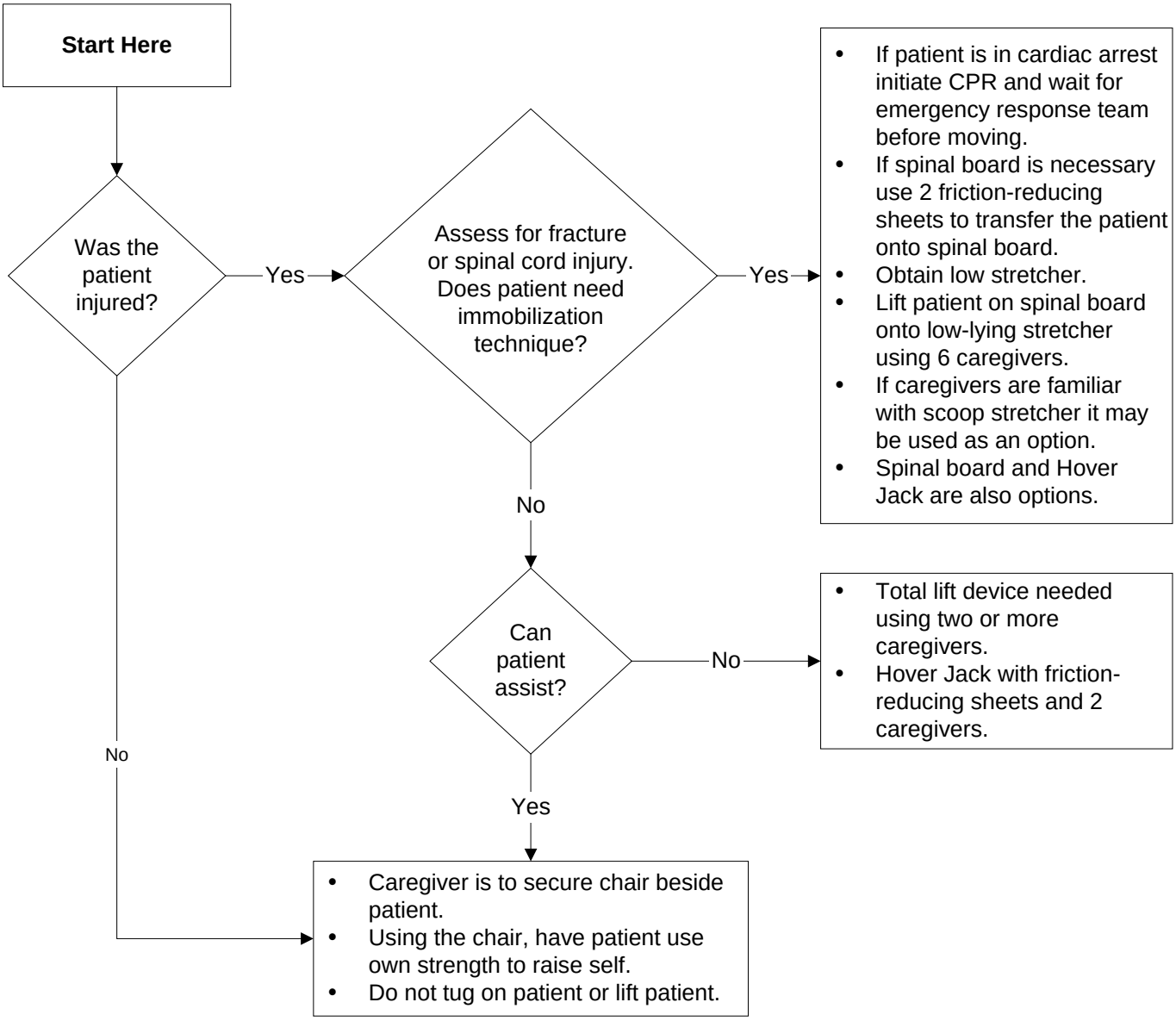


Considerations:

- Is bathroom doorway wide enough to accommote entry of mechanical lift device and patient?
- Assure equipment used meets weight requirements and is appropriately sized for patient.
- Typically, standard toilets are rated to 350 lbs maximum capacity.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight, then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

Bariatric Algorithm 8: Transfer a Bariatric Patient Up From the Floor

Last rev. 10/1/08

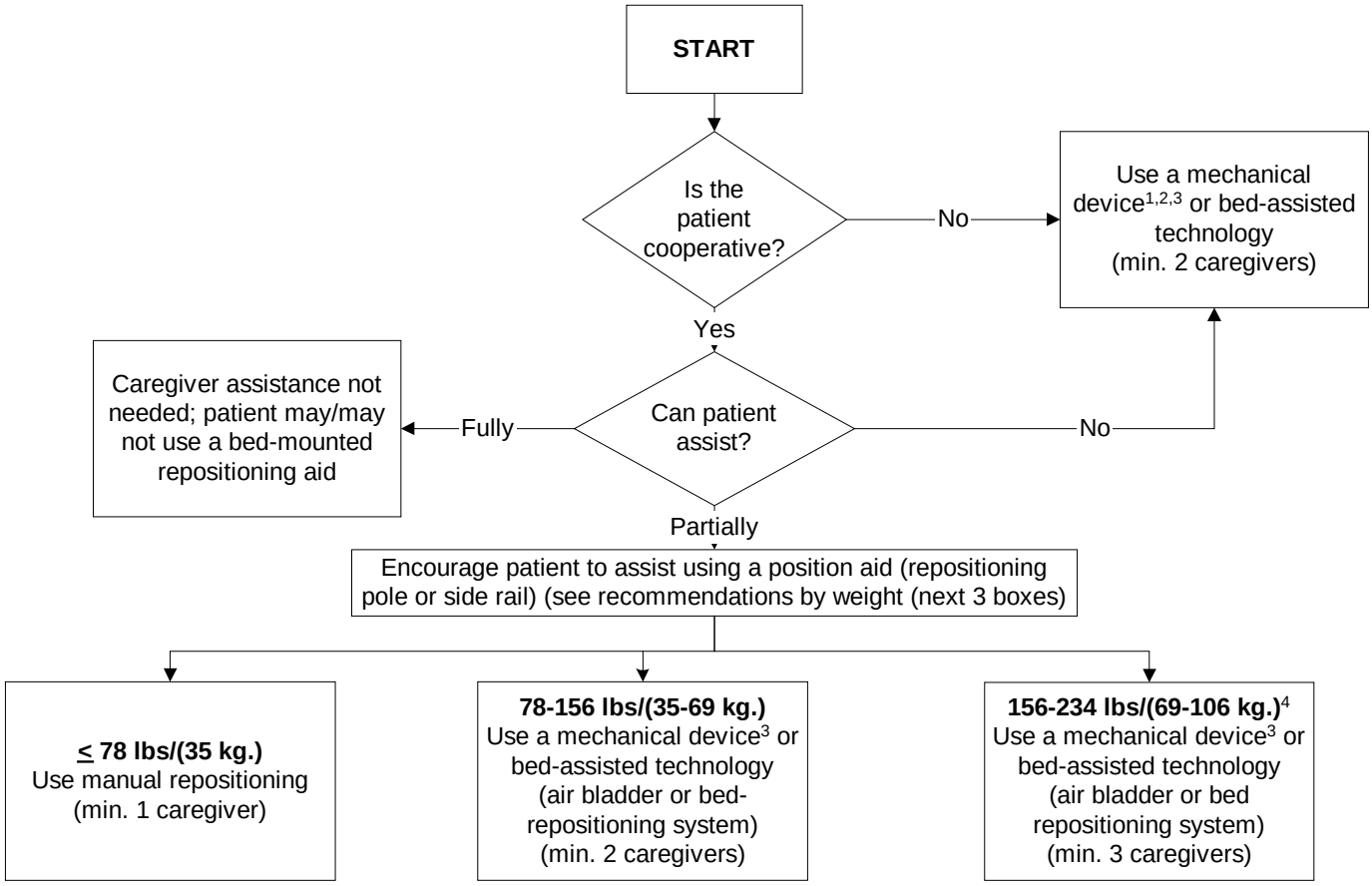


- Do <u>not</u> lift patient off floor.
- Do not allow patient to lean on caregiver for base of support.
- "Immobilization Technique" definition: use spinal precautions if can't use lift due to suspect hip, pelvic, or vertebral fractures.
- Use floor-based lift that goes all the way down to the floor (most of the newer models are capable of this).
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs of a patient's weight then the patient should be considered to be fully dependent and assistive devices should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*[8], 53-59.)

Orthopaedic Algorithm #1: Turning Patient in Bed (Side-to-Side)

Patient with Orthopaedic Impairments

September 25, 2008



FOOTNOTES:

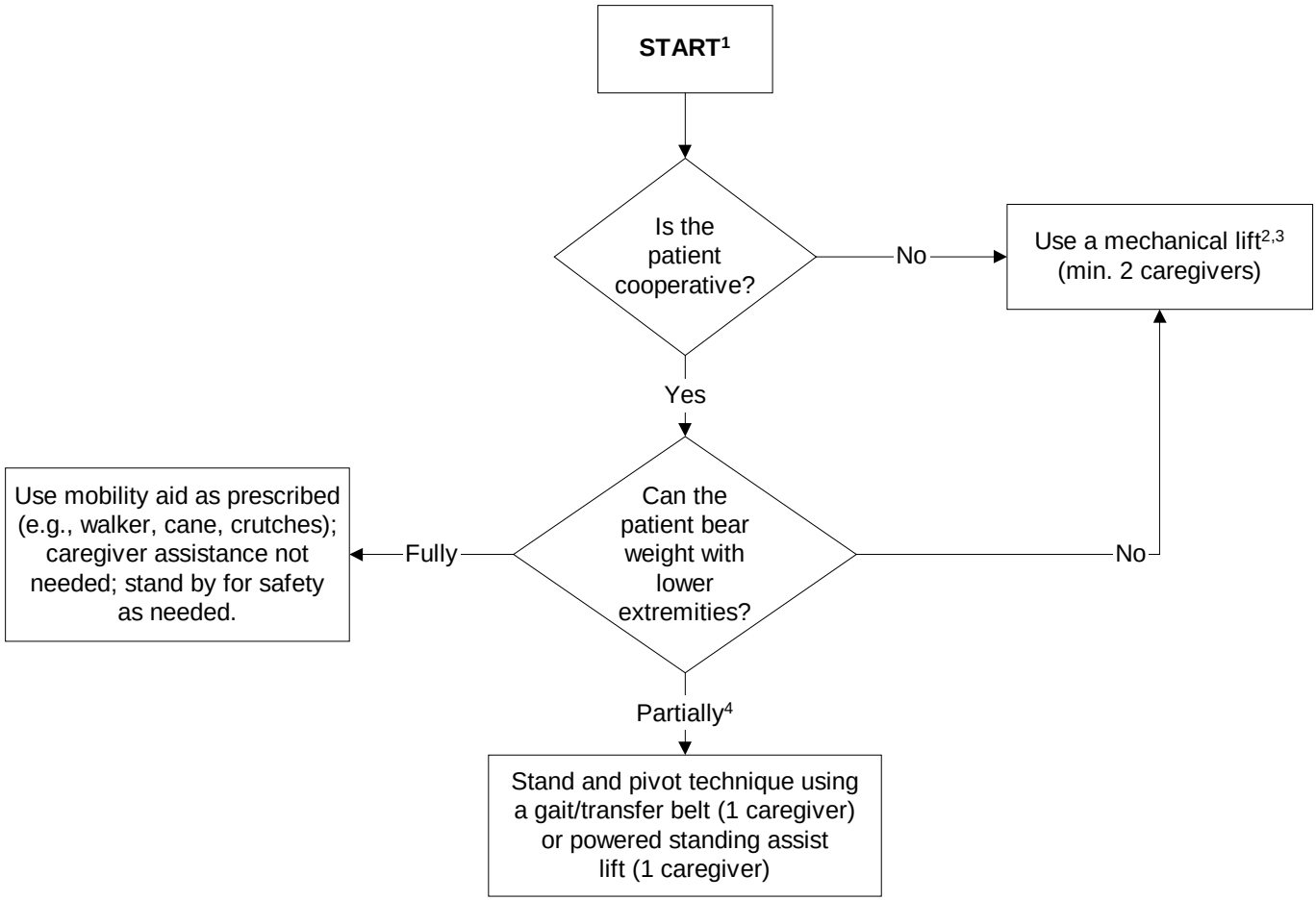
1. Maintain orthopaedic precautions as prescribed while performing this activity such as total hip, knee, shoulder, or spine precautions.
2. Select sling to meet and maintain the patient's pre-op or post-op positioning guideline/precautions for the affected limb/body part(s). For more information on sling section, see Appendix A.
3. Examples of repositioning mechanical devices are: **Turning clips:** these simple slips attach to a bed sheet and can be used with a floor-based lift or ceiling-based lift to facilitate turning a patient. **Turning straps/slings:** one end of these straps or slings is connected to the bed and the other end is attached to either a ceiling or floor based lift to facilitate turning the patient. **Powered mechanical devices:** a ceiling lift is a powered overhead lift that can be used with a repositioning sling to turn a patient in bed. **Friction reducing devices:** either tubular in design, or two separate pieces of material are placed under the patient to assist in turning the patient in bed or moving the patient to the head of the bed. **Pulley systems:** these devices work by use of a pulley system and an overhead frame. The user turns a crank, which engages the pulley system to retract straps that are connected to a rod and bed sheet, thus turning the patient on the side.
4. If the patient weighs more than 234 lbs. mechanical assistive devices should be used to assist. Use your best clinical judgment for the number of caregivers required to assist.

GENERAL NOTES:

- For any patient who has, or is at risk for a pressure ulcer, care should be taken to avoid shearing force (such as using a friction reducing device for repositioning in bed). Shearing force is when there are two forces moving in opposite directions adjacent to each other (like scissors).
- The height of the bed should be appropriate for staff safety (at elbow height).
- During any patient handling task, if the caregiver is required to lift more than 35 lbs./(16 kg.) of a patient's weight, then the patient should be considered fully dependent and an assistive device should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing*, *107*(8), 53-59).

Orthopaedic Algorithm #2: Vertical Transfer of a Post-Operative Total Hip Replacement Patient (Bed to Chair, Chair to Toilet, Chair to Chair, or Car to Chair)

September 25, 2008



FOOTNOTES:

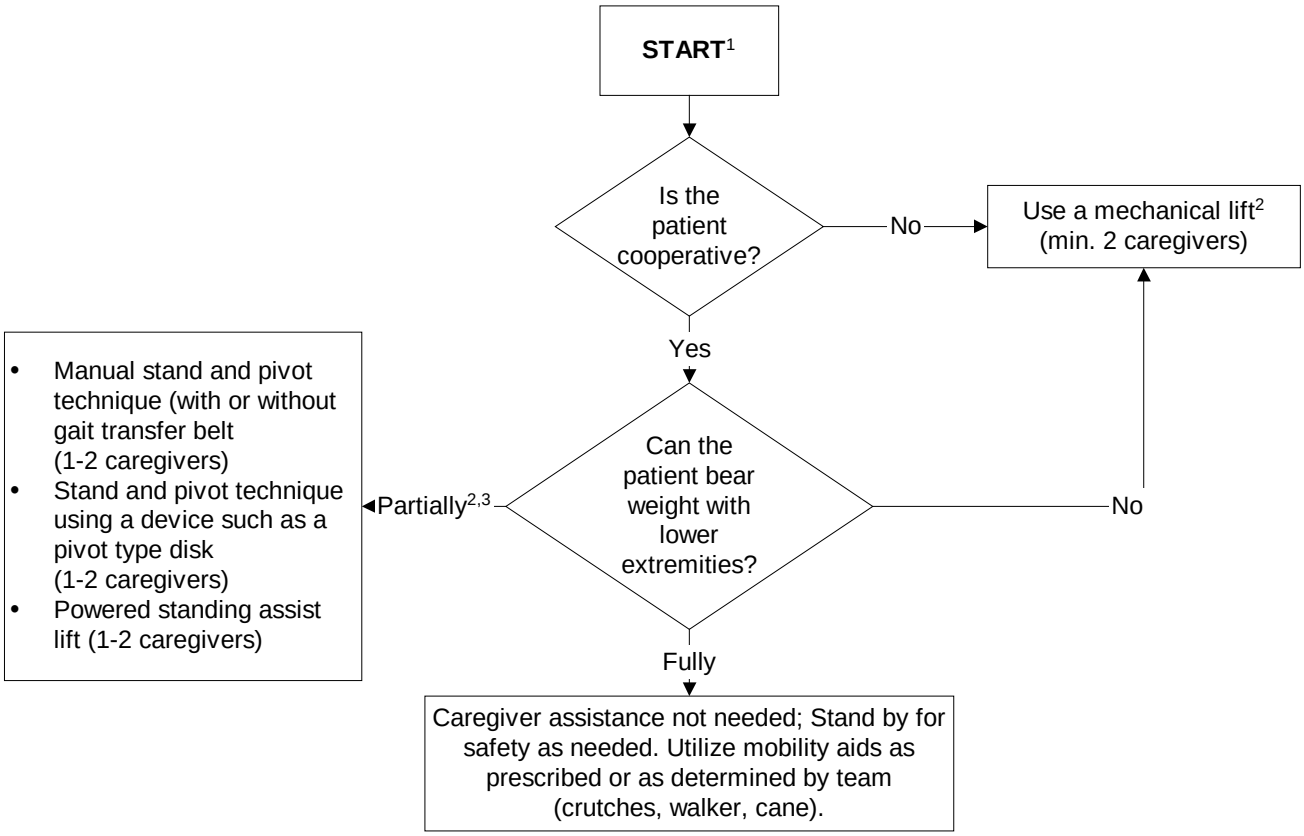
1. See 1A, 1B, 1C, 1D below for techniques to position patient at side of bed.
   1A. Moving from supine head of bed elevated to sitting at edge of bed requires: Patient's ability to shift their seated weight in a sitting position. Typically accomplished by unweighting one buttock and moving it toward the edge of the bed; repeating this in alternating fashion until patient is sitting at edge of bed.
   1B. With an impaired upper or lower extremity, caregiver might need to support the limb while patient attempts #1A.
   1C. If patient is unable to accomplish #1A with #1B and the amount of assistance from caregiver will exceed 35 lbs., then a mechanlical lift device should be used to achive sitting position at the edge of the bed.
   1D. Anti-friction sheets and seated discs might be useful when the amount of caregiver assistanace is close to recommended limits; be aware of skin shearing risks. Shearing forces are caused when there are two forces moving in opposite directions adjacent to each other (like scissors).
2. Maintain orthopaedic precautions as prescribed while performing this activity such as total hip, knee, shoulder, or spine precautions.
3. Select sling to meet and maintain the patient's pre-op or post-op positioning guideline/precautions for the affected limb/body part(s). For more information on sling section, see Appendix A.
4. This will include situations where the patient may be allowed: a) Limited weight bearing on one lower extremity and full weight bearing on the other extremity; b) Partial weight bearing through both lower extremities.

GENERAL NOTES:

- If patient has partial weight bearing capacity, transfer toward stronger side.
- For car transfers: a) If patient cannot tolerate a seated position when doing a car transfer use a stretcher transfer or alternative transportation may be required; b) All car transports should comply with state laws for both children and adults; c) Don't forget to use all of the features of the car (ie., adjustability of the seat) during the transfer.
- The height of the bed should be appropriate for staff safety (at elbow height).
- During any patient handling task, if the caregiver is required to lift more than 35 lbs./(16 kg.) of a patient's weight, then the patient should be considered fully dependent and an assistive device should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing*, 107(8), 53-59).

Orthopaedic Algorithm #3: Vertical Transfer of a Patient with an Extremity Cast/Splint

September 25, 2008



FOOTNOTES:

1. Moving from supine head of bed elevated to sitting at edge of bed requires a patient's ability to shift their seated weight in a sitting position:

a. When assistance is not required, this is typically accomplished by unweighting one buttock and moving it toward the edge of the bed; repeating this in alternating fashion, until patient is sitting at the edge of the bed.

b. With an impaired upper or lower extremity:

- if the amount of assistance from caregiver does not exceed 35 lbs., caregiver may provide limb support while patient moves unassisted to side of bed (see a. above)
- if the amount of assistance from caregiver may exceed 35 lbs., then a limb support strap/sling with a mechanical lift will provide limb support while patient moves unassisted to side of bed (see 1a. above)

c. If patient is unable to accomplish a. and/or b. then utilize one of the following options:

- mechanical lift device with a seated sling to lift patient to side of bed
- friction-reducing device to assist staff in pulling patient to side of bed.

d. Friction-reducing devices and seated discs may be useful when the amount of caregiver assistance is close to recommended limits, but be aware of skin shearing risks. Shearing is caused when there are two forces moving in opposite directions adjacent to each other (like scissors).

2. Select sling to meet and maintain the patient's pre-op or post-op positioning guideline/precautions for the affected limb/body part(s). For more information on sling selection, see Appendix A.

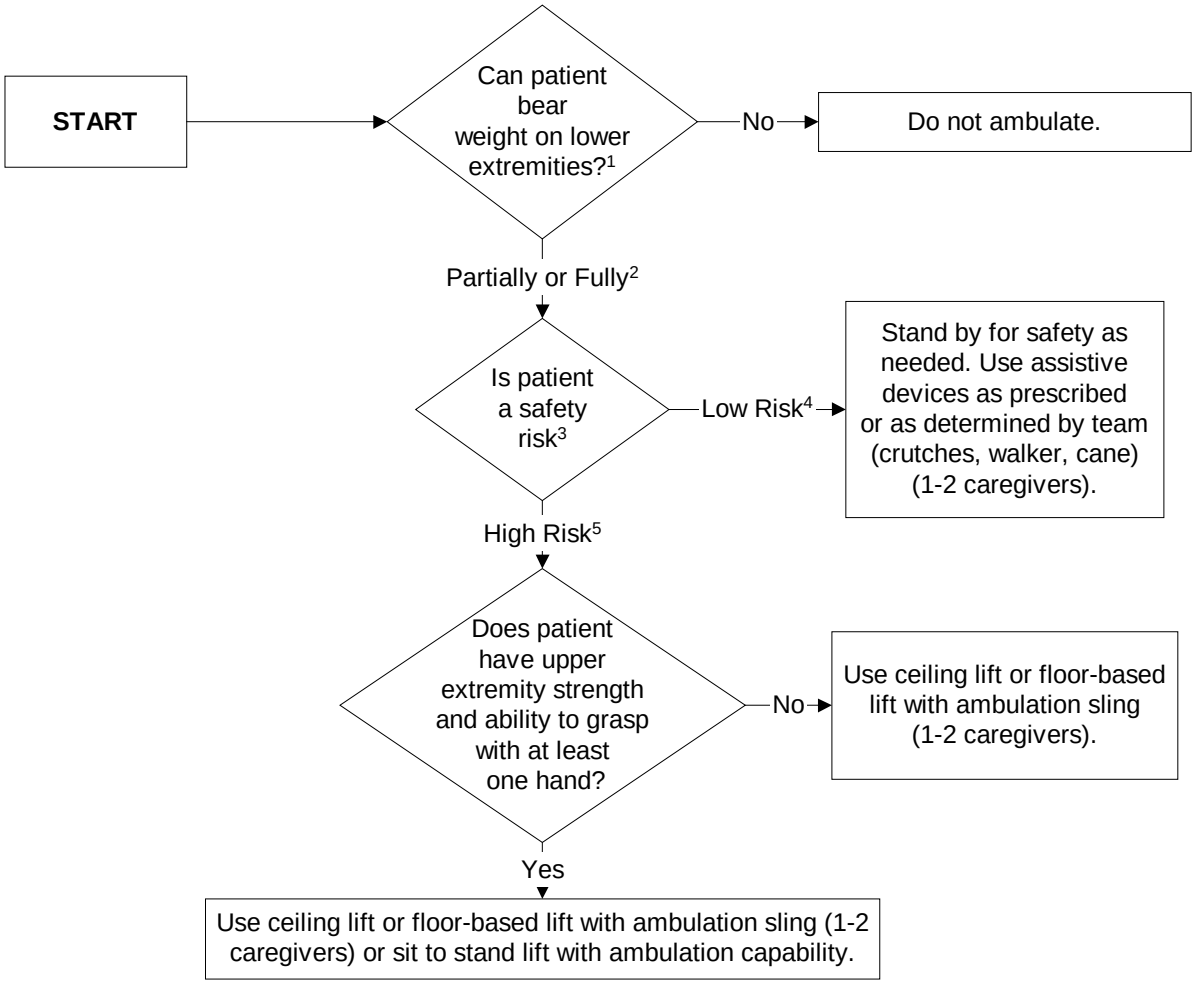
3. Patient can bear weight on one leg only (e.g., weight bearing on unaffected limb or limited weight bearing on affected limb).

GENERAL NOTES:

- Need to test the fit of the sling with an immobilized extremity.
- Maintain affected extremity immobilization/alignment.
- Use lift device with limb sling if applicable.
- During any patient handling task, if the caregiver is required to lift more than 35 lbs./(16 kg.) of a patient's weight, then the patient should be considered fully dependent and an assistive device should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing*, 107(8), 53-59).

Orthopaedic Algorithm #4: Ambulation

September 25, 2008



FOOTNOTES:

1. Non-weight bearing: Patient is unable to bear weight through both lower extremities or weight-bearing through both lower extremities is contraindicated.
2. Partial weight bearing: This will include situations where the patient may be allowed: a) Limited weight bearing on one lower extremity and full weight bearing on the other extremity; b) Partial weight bearing through both lower extremities.
3. Safety risks may include: decreased cognition; decreased ability to cooperate/ combativeness; medical stability.
4. Factors that contribute to low safety risk: a) Lack of combativeness; b) Ability to follow commands; c) Medical stability; d) Experience with the assistive device.
5. Factors that contribute to high safety risk: a) Combativeness; b) Lack of ability to follow commands; c) Medical instability; d) Lack of experience with the assistive device, e) neurological deficits.

GENERAL COMMENTS/DISCUSSION:

- In healthcare, weight-bearing is often used to describe the amount of weight bearing that the patient can or has done. In orthopedics, weight-bearing status is prescribed by the physician based on the patient's ability to safely bear weight through the musculoskeletal system. Exceeding the prescribed weight-bearing status may be detrimental to the patient.
- Patients should be assessed for safety risks as described above. If patients are determined to be at significant risk for falls, then care givers assisting with ambulation are also at risk for assisting patients to prevent fall. In high risk situations precautions should be taken, and devices such as walking slings should be used. At some point in care, the team will need to weigh the risks of falls with the benefits of ambulation and take a "therapeutic" risk in order to functionally advance the patient.
- Need to test the fit of the sling with an immobilized leg. For more information on on sling selection, see Appendix A.
- Maintain affected extremity immobilization/alignment.
- During any patient handling task, if the caregiver is required to lift more than 35 lbs./(16 kg.) of a patient's weight, then the patient should be considered fully dependent and an assistive device should be used. (Waters, T. [2007]. When is it safe to manually lift a patient? *American Journal of Nursing, 107*(8), 53-59).

Orthopaedic Clinical Tool #1: Lifting and Holding Legs or Arms in an Orthopaedic Setting

Introduction

Often when orthopaedic care is being provided, the care giver must lift and/or hold a limb in place while some type of treatment is being provided, such as cast application. It is assumed that you are maintaining a neutral (upright) body posture (not fully flexed); adjust the height of the table. When a caregiver must lift a leg or arm, it is important to make sure that the weight of the limb being lifted does not exceed the strength capability of the caregiver. An ergonomic tool has been developed to assist caregivers in determining whether a specific lift and/or hold of a limb is acceptable and whether some type of lift or hold assist device is needed. For lifts of limbs with casts, an alternate method is presented for assessing whether the lift is acceptable or not as presented in Table #1.

This tool shows the calculation of the average weight for an adult patient's leg and arm as a function of whole body mass, ranging from slim to morbidly obese body type. Weights are presented both in pounds (lbs.) and metric (kg.) units. Maximum lift and hold loads were calculated based on 75th percentile shoulder flexion strength and endurance capability for US adult females, where the maximum weight for a one-handed lift is 11.1 lbs. and a two-handed lift, 22.2lbs.

Table 1. Ergonomic Tool: Lifting and Holding Legs or Arms in an Orthopaedic Setting*

Patient Weight lbs. (kg.)	Body Part	Body Part Weight Lbs. (kg.)		Lift 1- hand	Lift 2- hand	Hold 2-hand 1 min.	Hold 2-hand 2 min.	Hold 2-hand 3 min.
<40 lbs.	Leg	<6.3 lbs.	(3 kg.)					
(< 18 kg.)	Arm	<2.0 lbs.	(1 kg.)					
40-90 lbs.	Leg	<14.1 lbs .	(6 kg.)					
(18-41 kg.)	Arm	<4.6 lbs.	(2 kg.)					
90-140 lbs.	Leg	<22.0 lbs.	(10 kg.)					
(41-64 kg.)	Arm	<7.1 lbs.	(3 kg.)					
140-190 lbs.	Leg	<29.8 lbs.	(14 kg.)					
(64-86 kg.)	Arm	<9.7 lbs.	(4 kg.)					
190-240 lbs.	Leg	<37.7 lbs.	(17 kg.)					
(86-109 kg.)	Arm	<12.2 lbs.	(6 kg.)					
240-290 lbs.	Leg	<45.5 lbs.	(21 kg.)					
(109-132 kg.)	Arm	<14.8 lbs.	(7 kg.)					
290-340 lbs.	Leg	<53.4 lbs.	(24 kg.)					
(132-155 kg.)	Arm	<17.3 lbs.	(8 kg.)					
340-390 lbs.	Leg	<61.2 lbs.	(28 kg.)					
(155-177 kg.)	Arm	<19.9 lbs.	(9 kg.)					
390-440 lbs.	Leg	<69.1 lbs.	(31 kg.)					
(177-200 kg.)	Arm	<22.2 lbs.	(10 kg.)					
> 440 lbs.	Leg	>69.1 lbs.	(31 kg.)					
(>200 kg.)	Arm	>22.2 lbs.	(10 kg.)					

* No shading: Lift and hold is appropriate but use clinical judgment and do not hold longer than noted.
Heavy shading: Do not lift alone; use assistive device or more than one caregiver.

The shaded areas of the table indicate whether it would be acceptable for one caregiver to lift the listed body parts with one or two hands or hold the respective body parts for 1, 2, or 3 minutes with two hands. Respecting these limits will minimize risk of muscle fatigue and the potential for musculoskeletal disorders. If the limb weight exceeds the values listed in the table it is recommended to use assistive technology, such as a ceiling lift or floor based lift with a limb support sling. Orthopaedic caregivers must use clinical judgment to assess the need for additional staff member assistance or assistive devices to lift and/or hold one of these body parts for a particular period of time.

Note: It is important to remember that the chart shows the acceptable weights for limbs without a cast in place. If the caregiver is lifting a limb with a cast, the additional weight of the cast should be added to the weight of the limb to determine whether the lift is acceptable. An alternate method is provided below for limbs with casts. These are guidelines for the average weight of the leg and arm, and are based upon the patient's weight. The maximum weight for a 1-handed lift is 11.1 lbs. and a 2-handed lift, 22.2 lbs.

Patient weight is divided into weight categories (see Table 1), ranging from very light to morbidly obese. Normalized weight for each leg and each arm are calculated as a percentage of body weight where each complete arm weighs 5.1% of total body mass and each leg weighs 15.7% of total body mass (Chaffin, Anderson, & Martin, 1999). All weights are presented in both pounds and kilograms, rounded to the nearest whole unit.

To accommodate 75% of the US adult female working population, maximum load for a 1-handed lift is calculated to be 11.1 lbs. (5.0 kg.). This is determined by calculating the strength capabilities for 25th percentile US adult female maximum shoulder flexion movement (the mean equals 40 Newton meters, standard deviation equals 13 Nm) (Chaffin, Anderson, & Martin, 1999) and 75th percentile US adult female shoulder to grip length (the mean equals 610 mm, the standard deviation equals 30 mm) (Pheasant, 1992). Maximum loads for one person for a 2-handed lift (i.e., 22.2 lbs. /10.1 kg.) are calculated as twice that of a 1-handed lift. Muscle strength capabilities diminish as a function of time, therefore, maximum loads for 2-handed holding of body parts are presented for 1, 2, and 3 minute durations. After 1 minute, muscle endurance has decreased by 48%, decreased by 65% after 2 minutes, and, after 3 minutes of continuous holding, strength capability is only 29% of initial lifting strength (Rohmert, 1973, a, b). If the limits in ergonomic Table 1 are exceeded, additional staff members or assistive limb holders should be used.

References

Chaffin, D. B., Anderson, G.B.J., & Martin, B.J. (1999). *Occupational biomechanics* (3rd ed.). New York, NY: J. Wiley & Sons

Pheasant, S. (1992). *Bodyspace*. Taylor & Francis, Ltd: London.

Rohmert,W. (1973a). Problems of determination of rest allowances. Part 1: Use of modern methods to evaluate stress and strain in static muscular work. *Applied Ergonomics, 4*(2), 91-95.

Rohmert,W. (1973b) Problems of determination of rest allowances. Part 2: Determining rest allowances in different human tasks. *Applied Ergonomics, 4*(3), 158-162.

Waters, T. (2007). When is it safe to manually lift a patient? *American Journal of Nursing, 107*(8), 53–59.

Orthopaedic Clinical Tool #2: Alternate Method for Determining Safe Lifting and Holding of Limbs with Casts

Table 2.1. Predicted Weight for Different Types of Casts

Limb	Limb Weight Factor	1-hand	2-hands	2-hands 1 min.	2-hands 2 min.	2-hands 3 min.
Leg	0.157	11.1 lbs. (5.1 kg.)	22.2 lbs. (10.2 kg.)	11.6 lbs. (5.3 kg.)	7.8 lbs. (3.5 kg.)	6.4 lbs. (2.9 kg.)
Arm	0.051					

Multiply the patients' weight times the limb factor (0.157 for leg and 0.051 for arm) and add the weight of the cast. Compare the calculated weight to the value in the appropriate task box. If the total limb weight exceeds the weight in the appropriate box, then the caregiver should not manually lift the limb alone, but should use an assistive device or more than one caregiver to perform the lift. On the other hand, if the calculated weight is less than the value in the appropriate box, then it is acceptable to manually lift and hold the limb and the caregiver should use clinical judgment and not hold longer than noted.

For example if the patient weighs 200 lbs. and has an arm cast weighing 5 lbs., then the total arm weight would be 200 lbs. x 0.051 plus 5 lbs., or 15.2 lbs. In this case, the arm should not be lifted with one hand (i.e., 15.2 lbs. > 11.1 lbs.) but could be lifted with two hands (i.e., 15.2 lbs. < 22.2 lbs.), but not held in that position less than a few seconds (15.2 lbs. > 11.6 lbs.). Similarly, if the patient weighs 75 lbs. and has a 5 lb. leg cast, then the total limb weight would be 75 lbs. x 0.157 plus 5 lbs., or 16.8 lbs. In this case, it would not be acceptable to lift the limb with one hand (i.e., 16.8 lbs. > 11.1 lbs.), but it would be acceptable to lift it with two hands (i.e., 16.8 lbs. < 22.1 lbs.), but should not be held more than a few seconds (16.8 lbs. > 11.6 lbs.).

Table 2.2. Predicted Weights for a Fiberglass Cast

The following Table 2.2 provides some predicted weights for a fiberglass cast.

Short Arm Cast (adult)	Long Arm Cast (adult)	Short Leg Walking Cast (150 lbs. adult)	Long Leg Cast (150 lbs. adult)	Infant Body Spica 20-30 lbs.	Child Body Spica 3-5 yr old 30-50 lbs.
0.5 lbs.	1 lbs.	2 lbs.	3.0 lbs.	2 lbs.	4lbs.
2 rolls 3"	1 roll 2" 3 rolls 3"	4 rolls 4"	3 rolls 3" 3 rolls 4"	2 rolls 2" 3 rolls 3"	5 rolls 3" 5 rolls 4"
+ webril*	+ webril*	+ webril*	+ webril*	+ webril*	+ webril*

*Weight of webril is 0.25 lb. per packet

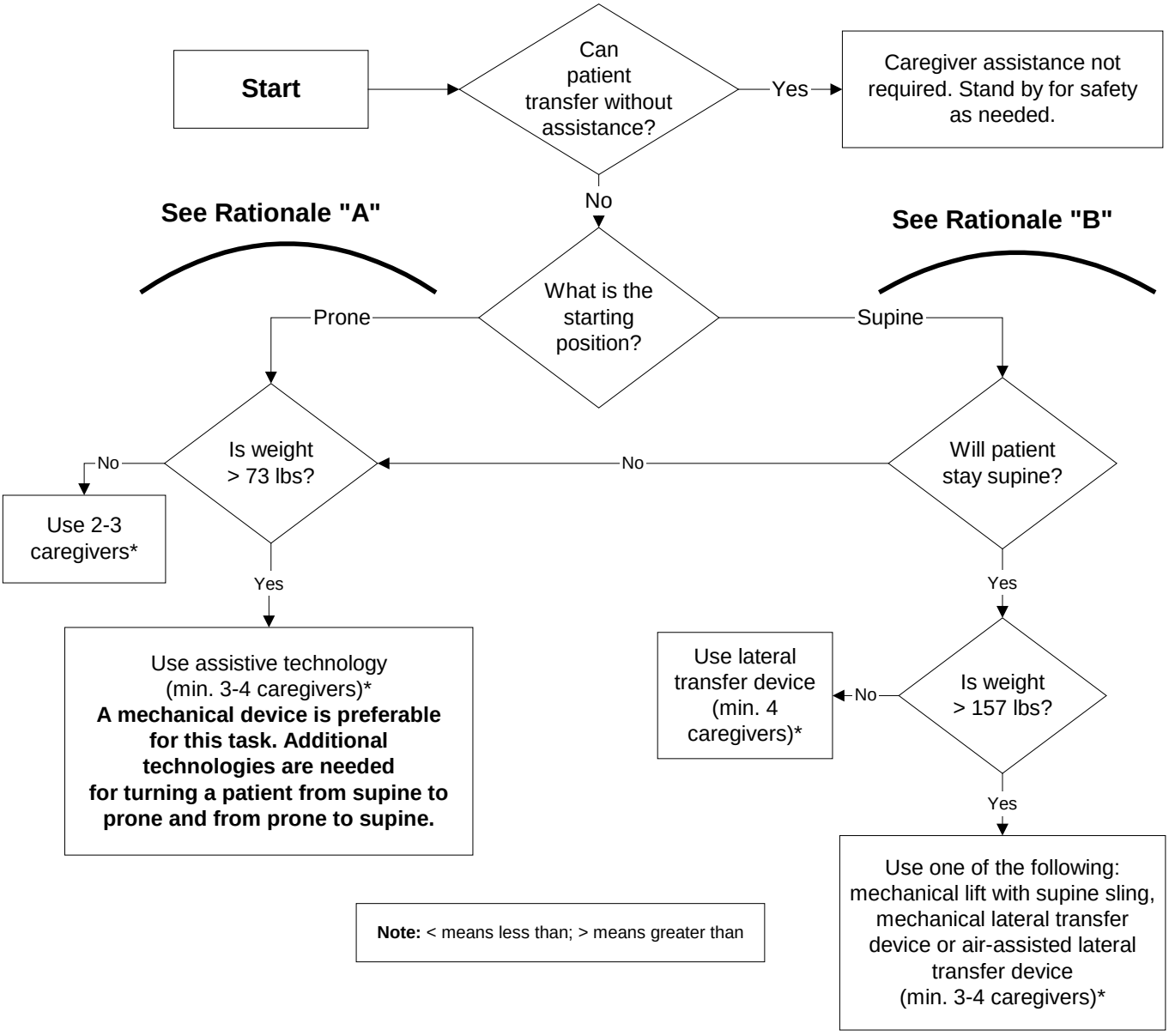
Notes to Algorithms and Clinical Tools for Safe Patient Handling in an Orthopaedic Setting: Helpful Hints

Selection of the appropriate sling accessory for movement / lift /transfer, must include the following considerations:

- Decision to transfer pt. in sitting vs. supine position – choose correct functionality of the sling
- Select appropriate size
- Maintain alignment of the affected body part(s) according to pre-op/ post-op guidelines
    - Consider the patient's body size, shape and features (e.g. very Large abdominal girth can limit degree of hip flexion)
    - Features of sling –
        - consider where material covers patient.
        - strap options for seated slings-the length of material for strap supports of the lower extremities can often be modified by selecting differing loop attachment points of the sling onto the hanger bar (e.g. providing more material length will allow lower extremity to be in less flexed position)
        - seated slings back height can vary from supporting whole trunk and head to covering pelvis/waist only. When upper extremities are involved, consider height of the sling – high back slings will wrap around and enclose an upper extremity, while a low back sling will allow upper extremity to be free
- If alignment / positioning guidelines can not be met with sling accessory available, transfer pt in supine with sheet style sling or anti-friction methods, then sit upright
- The "Patient Care Sling Selection and Usage Toolkit" is available for download at: http://www.visn8.va.gov/patientsafetycenter/safePtHandling/toolkitSlings.asp

Ergonomic Tool #1. Lateral Transfer from Stretcher to and from the Operating Table

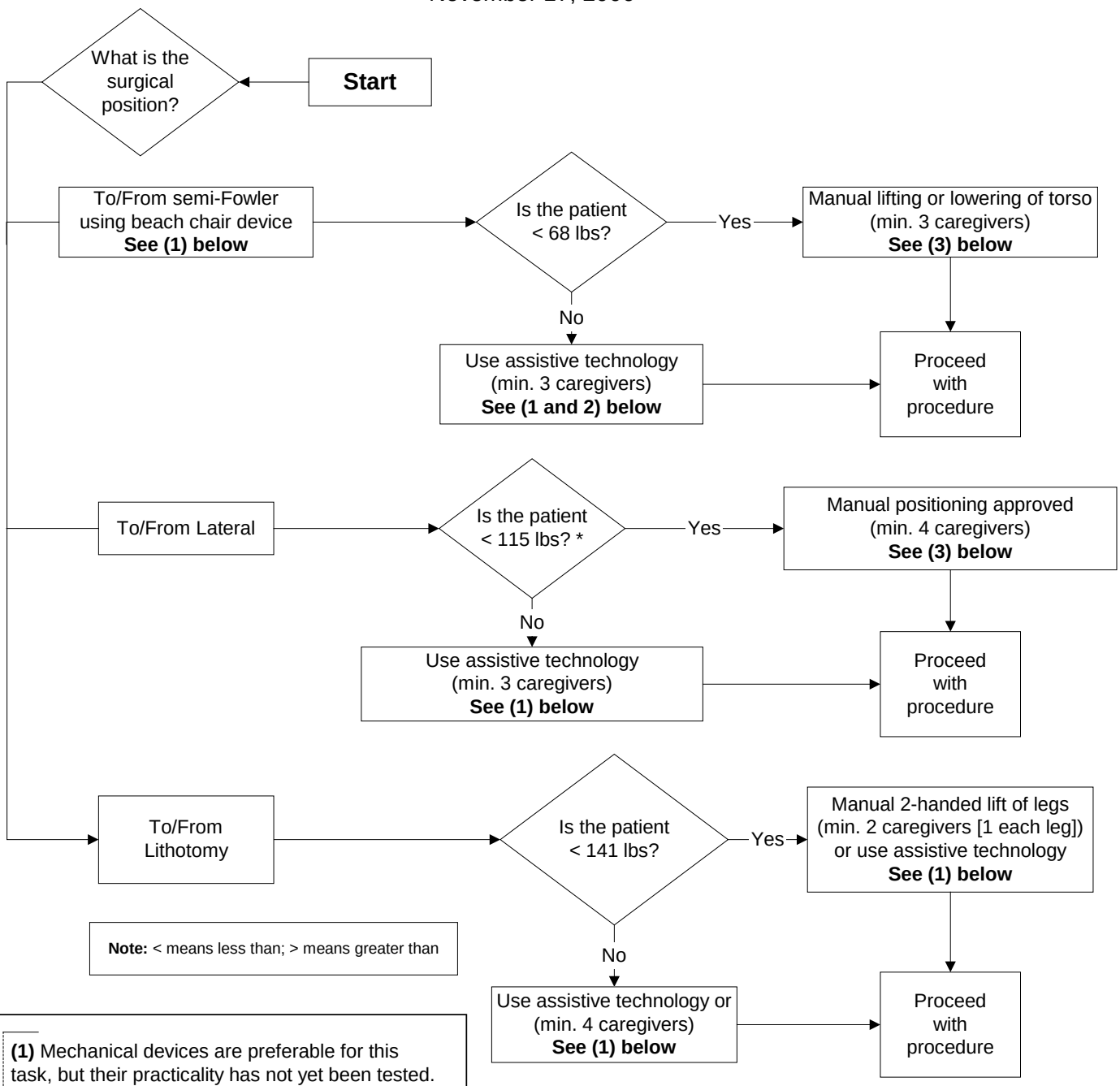
September 28, 2006



- * One of the caregivers may be the anesthesia provider
- The number of personnel to safely transfer the patient should be adequate to maintain the patient's body alignment, support extremities and maintain patient's airway.
- For lateral transfers it is important to use a lateral transfer device that extends the length of the patient.
- Current technologies for supine to prone include: Jackson Frame, Spine Table, etc.
- Destination surface should be slightly lower for all lateral patient moves.
- A separate algorithm for prone to jackknife is not included as this is assumed to be a function of the table.
- If patient's condition will not tolerate a lateral transfer, consider the use of a mechanical lift with a supine sling.
- During any patient transferring task, if any caregiver is required to lift more than 35 lbs. of a patient's weight, assistive devices should be used for the transfer.
- While some facilities may attempt to perform a lateral transfer simultaneously with positioning the patient in a lateral position (side-lying), this is not recommended until new technology is available.
- The assumption is that the patient will leave the operating room in the supine position.

Ergonomic Tool #2. Positioning/Repositioning the Patient on the OR Table to and from the Supine Position

November 17, 2006



Note: < means less than; > means greater than

(1) Mechanical devices are preferable for this task, but their practicality has not yet been tested. There are special slings and straps that can be used with mechanical devices. For example, turning straps can be used to turn a patient to and from lateral or supine, or limb support slings can be used to lift the legs to and from lithotomy. More research is needed.
(2) Use the automatic semi-fowler positioning feature of your electric table if available.
(3) One of these caregivers could be the anesthesia provider to hold the head and maintain the airway.

- * Note: This differs from Algorithm 1 (157) lbs because a 4th caregiver is involved.
- During any patient handling task, if any caregiver is required to lift more than 35 lbs. of a patient's weight, an assistive device should be used.
- The number of personnel to safely position the patient should always be adequate to maintain the patient's body alignment.
- A separate algorithm for prone to jackknife if not included as this is assumed to be a function of the table.

Ergonomic Tool #3: Lifting and Holding Legs, Arms, and Heads for Prepping in a Perioperative Setting

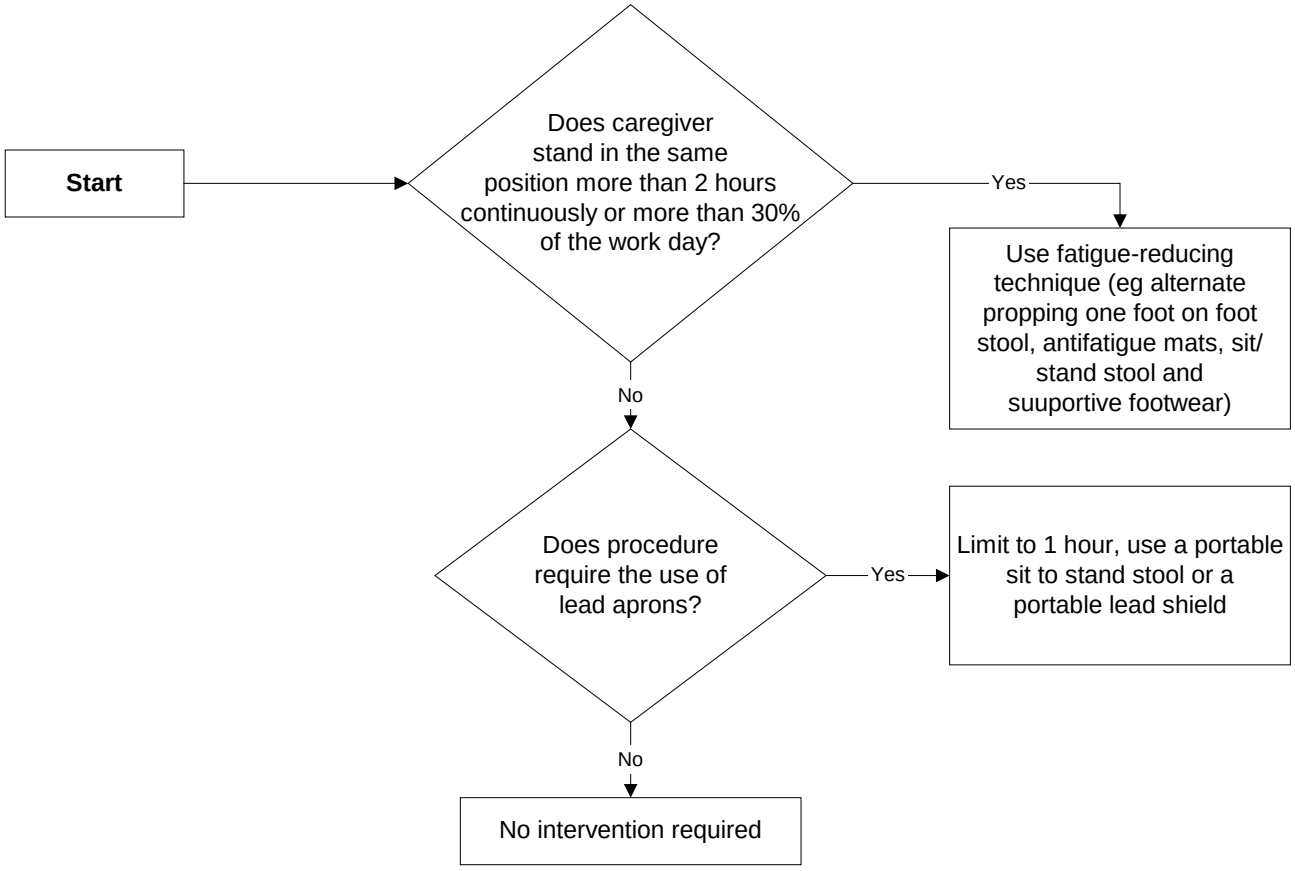
Key

No shading	OK to lift and hold, use clinical judgment, do not hold longer than noted
Heavy shading	Do not lift alone, use assistive device or more than one caregiver

Patient Weight lbs (kg)	**Body Part**	**Body Part Weight lbs** (kg)		**Lift 1- hand**	**Lift 2- hand**	**Hold 2-hand ≤1 min**	**Hold 2-hand ≤2 min**	**Hold 2-hand ≤3 min**
≤120 lbs (≤ 54 kg)	**Leg**	**≤19 lbs**	(9 kg)					
	Arm	**≤6 lbs**	(3 kg)					
	Head	**≤10 lbs**	(5 kg)					
120-160 lbs (54-73 kg)	**Leg**	**≤25 lbs**	(11 kg)					
	Arm	**≤8 lbs**	(4 kg)					
	Head	**≤13 lbs**	(6 kg)					
160-200 lbs (73-91 kg)	**Leg**	**≤31 lbs**	(14 kg)					
	Arm	**≤10 lbs**	(5 kg)					
	Head	**≤17 lbs**	(8 kg)					
200-240 lbs (91-109 kg)	**Leg**	**≤38 lbs**	(17 kg)					
	Arm	**≤12 lbs**	(6 kg)					
	Head	**≤20 lbs**	(9 kg)					
240-280 lbs (109-127 kg)	**Leg**	**≤44 lbs**	(20 kg)					
	Arm	**≤14 lbs**	(6 kg)					
	Head	**≤24 lbs**	(11 kg)					
280-320 lbs (127-145 kg)	**Leg**	**≤50 lbs**	(23 kg)					
	Arm	**≤16 lbs**	(7 kg)					
	Head	**≤27 lbs**	(12 kg)					
>360 lbs (>163 kg)	**Leg**	**≥57 lbs**	(26 kg)					
	Arm	**≥18 lbs**	(8 kg)					
	Head	**≥30 lbs**	(14 kg)					

Ergonomic Tool #4. Prolonged Standing

November 14, 2006

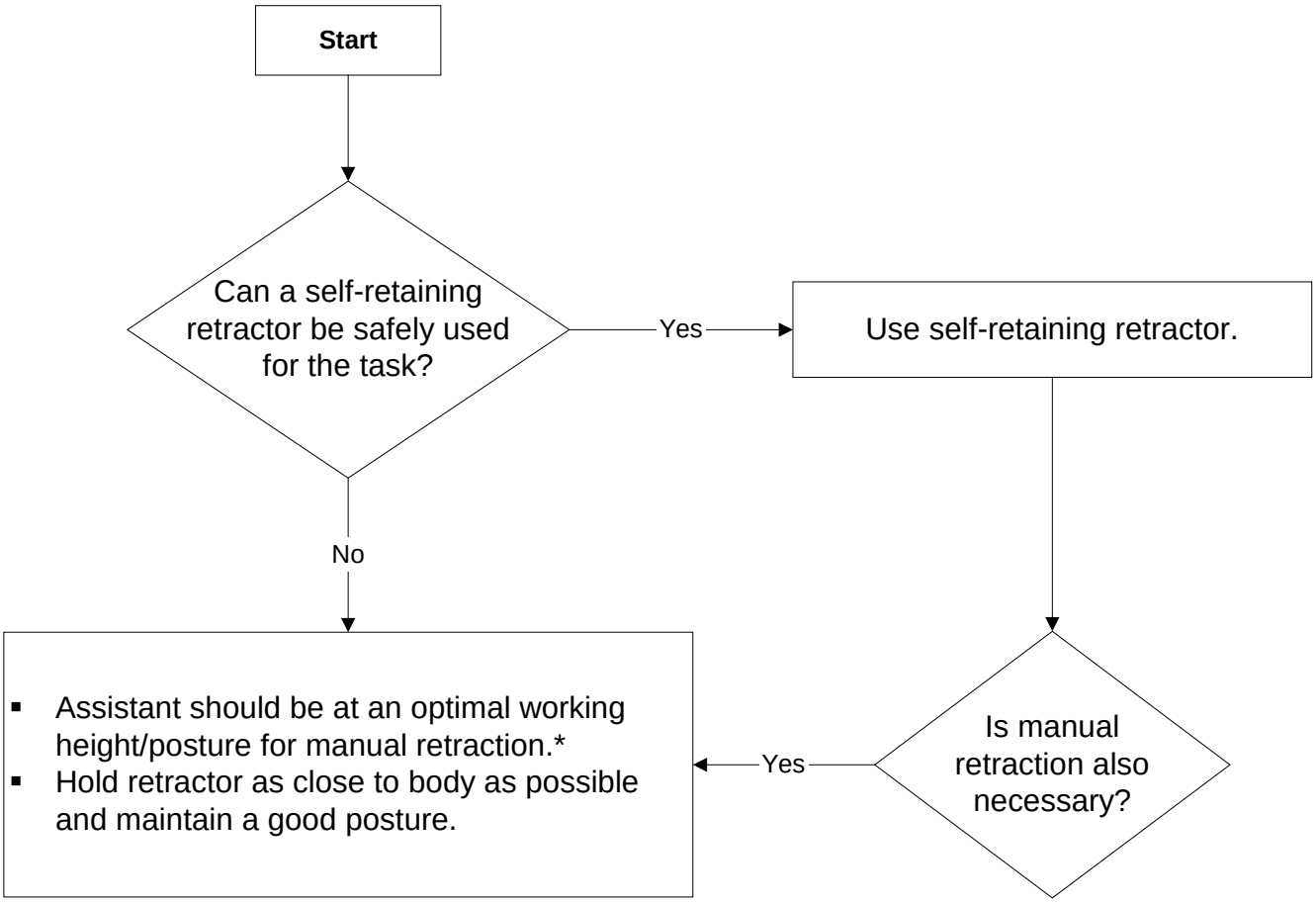


GENERAL RECOMMENDATIONS

- Caregivers should wear supportive footwear that has the following properties: does not change the shape of the foot; has enough space to move toes; shock-absorbing cushioned insoles; closed toe; height of heel in proportion to the shoe.
- Caregivers may benefit from wearing support stockings/socks.
- Anti-fatigue mats should be on the floors.
- Anti-fatigue mats should be placed on standing stools
- The sit-stand chair should be set to the correct height before setting the sterile field so they will not be changing levels during the procedure.*
- Be aware of infection control issues for non-disposable and anti-fatigue matting.
- The 2-hour limit on prolonged standing incorporates accommodations for pregnancy.
- Scrubbed staff should not work with the neck flexed more than 30 degrees or rotated for more than one minute uninterrupted.
- 2-piece lightweight lead aprons are recommended.
- During the sit-to-stand break, staff should look straight ahead for a short while.

* "AORN Recommended practices for maintaining a sterile field," in *Standards, Recommended Practices, and Guidelines* (Denver: AORN, Inc, 2006) 621-628.

Ergonomic Tool #5: Retraction (last updated Nov. 17, 2006)



* Optimal working height is defined as area between the chest and the waist height to operative field. Optimal posture is defined as perpendicular/straight-on to the operative field; asymmetrical posture may be acceptable depending on load and duration; torso twisting should be avoided at all times.

- Arm rests should be used as possible, and be large enough to allow repositioning of the arms.
- Under optimal working height and posture, an assistive device should be used to lift or hold more than 35 lbs.
- Further research is needed to determine time limits for exposure. This is a high risk task, therefore, team members should take rest breaks or reposition when possible.
- Avoid using the hands as an approach to retraction, it is very high risk for musculoskeletal or sharps injuries.

Lifting and Carrying Supplies and Equipment

Lifting Task	Lifting Index	Level of Risk
3,000 ml irrigation fluid	**<0.2**	
Sand bags	**0.3**	
Linen bags	**0.4**	
Lead aprons	**0.4**	
Custom sterile packs (eg, heart or spine)	**0.5**	
Garbage bags (full)	**0.7**	
Positioning devices off shelf or rack (eg, stirrups)	**0.7**	
Positioning devices off shelf or rack (eg, gel pads)	**0.9**	
Hand table (49” x 28”)-largest hand table-used infrequently	**1.2**	
Fluoroscopy Board (49” x 21”)	**1.2**	
Stirrups (2- one in each hand)	**1.4**	
Wilson frame	**1.4**	
Irrigation containers for lithotripsy (12,000 ml)	**1.5**	
Instrument pans	**2.0**	

Key

No shading	Minimal risk – Safe to lift
Light shading	Potential risk – Use assistive technology, as available
Heavy shading	Considerable risk – one person should not perform alone or weight should be reduced.

Note: Assistive devices include adjustable-height lift tables, rolling carts, two-wheeled carts, dollies, or mechanical transport devices.

Pushing, Pulling, and Moving Equipment on Wheels

OR Equipment	Pushing Force lbF (kgF)		Max Push Distance ft / (m)		Ergonomic Recommendation
Electrosurgery unit	**8.4 lbF**	(3.8 kgF)	**>200ft**	(60m)	Task is acceptable for 1 caregiver
Ultrasound	**12.4 lbF**	(5.6 kgF)	**>200ft**	(60m)	
X ray equipment portable	**12.9 lbF**	(5.9 kgF)	**>200ft**	(60m)	
Video towers	**14.1 lbF**	(6.4 kgF)	**>200ft**	(60m)	
Linen cart	**16.3 lbF**	(7.4 kgF)	**>200ft**	(60m)	
X ray equip – C-arm	**19.6 lbF**	(8.9 kgF)	**>200ft**	(60m)	
Case carts – empty	**24.2 lbF**	(11.0 kgF)	**>200ft**	(60m)	
OR stretcher unoccupied	**25.1 lbF**	(11.4 kgF)	**>200ft**	(60m)	
Case carts – full	**26.6 lbF**	(12.1 kgF)	**>200ft**	(60m)	
Microscopes	**27.5 lbF**	(12.5 kgF)	**>200ft**	(60m)	
Hospital bed – unoccupied	**29.8 lbF**	(13.5 kgF)	**>200ft**	(60m)	
Specialty equip carts	**39.3 lbF**	(17.9 kgF)	**>200ft**	(60m)	
OR stretcher - occupied 300 lbs	**43.8 lbF**	(19.9 kgF)	**>200ft**	(60m)	
Bed - occupied 300 lbs	**50.0 lbF**	(22.7 kgF)	**<200ft**	(30m)	Min 2 caregivers required
Specialty OR beds unoccupied	**69.7 lbF**	(31.7 kgF)	**<100ft**	(30m)	
OR bed unoccupied	**61.3 lbF**	(27.9 kgF)	**<25ft**	(7.5m)	Recommend powered transport device
OR bed occupied 300 lbs	**112.4 lbF**	(51.1 kgF)	**<25ft**	(7.5 m)	
Specialty OR beds - occupied 300 lbs	**124.2 lbF**	(56.5 kg)	**<25ft**	(7.5 m)	

Key

No shading	Minimal risk - Task is acceptable for 1 caregiver
Light shading	Moderate risk – Minimum of 2 caregivers or powered device recommended
Heavy shading	Considerable risk - Recommend powered transport device