Pocket Reference Guide

Safe Patient Handling and Movement in the Perioperative Setting

AORN

Ergonomic Tool #1: Lateral Transfer from Stretcher to and from the OR Bed

Potential Risk Factors:
- Excessive reaching
- Pushing or pulling
- Bending
- Awkward posture/position
- Excessive load

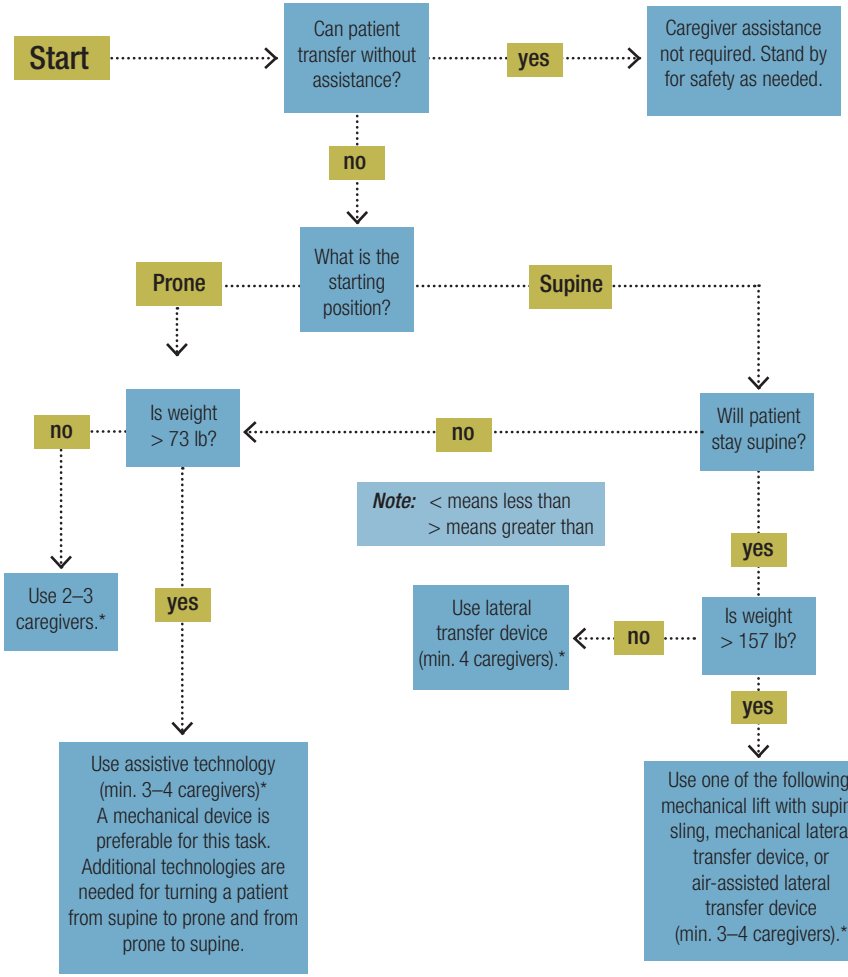
Location of Risk/Impact of Task:
- Back
- Shoulders
- Hands
- Knees

Essential Task Elements:
Maintain the patient's body alignment and airway, and support extremities during transfer to protect the patient from a positioning injury.

Task Recommendations:
General lateral transfer
- Use lateral transfer device that extends the length of the patient (eg, slider board)
- Destination surface should be slightly lower

Supine
- Anesthesiologist supports head and neck
- Weight < 157 lb
  - Use lateral transfer device and 4 caregivers
- Weight > 157 lb
  - Use mechanical lift with supine sling, mechanical lateral transfer device, or air-assisted lateral transfer device and 3 to 4 caregivers

Prone
- Anesthesiologist supports head and neck
- Weight < 73 lb
  - Use minimum of 2 caregivers, recommend 4
- Weight > 73 lb
  - Use minimum of 3 caregivers, recommend 4
  - Mechanical lift preferable



- 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 transfers include the Jackson frame and the spine table.
- Destination surface should be slightly lower for all lateral patient moves.
- A separate algorithm for prone-to-jackknife transfer is not included because this is assumed to be a function of the table.
- If the patient's condition will not tolerate a lateral transfer, consider the use of a mechanical lift with a supine sling.
- During any patient transfer 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 (ie, 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.

*One of the caregivers may be the anesthesia.

Ergonomic Tool #2: Positioning and Repositioning the Patient on the OR Bed into and from the Supine Position

Potential Risk Factors:

- Excessive reaching
- Pushing or pulling
- Bending
- Awkward posture/position
- Excessive load

Location of Risk/Impact of Task:

- Back
- Shoulders
- Hands
- Knees

Essential Task Elements:

Maintain the patient's body alignment and airway, and support extremities during transfer to protect the patient from a positioning injury.

Task Recommendations:

Move patient into and out of semi-Fowler position

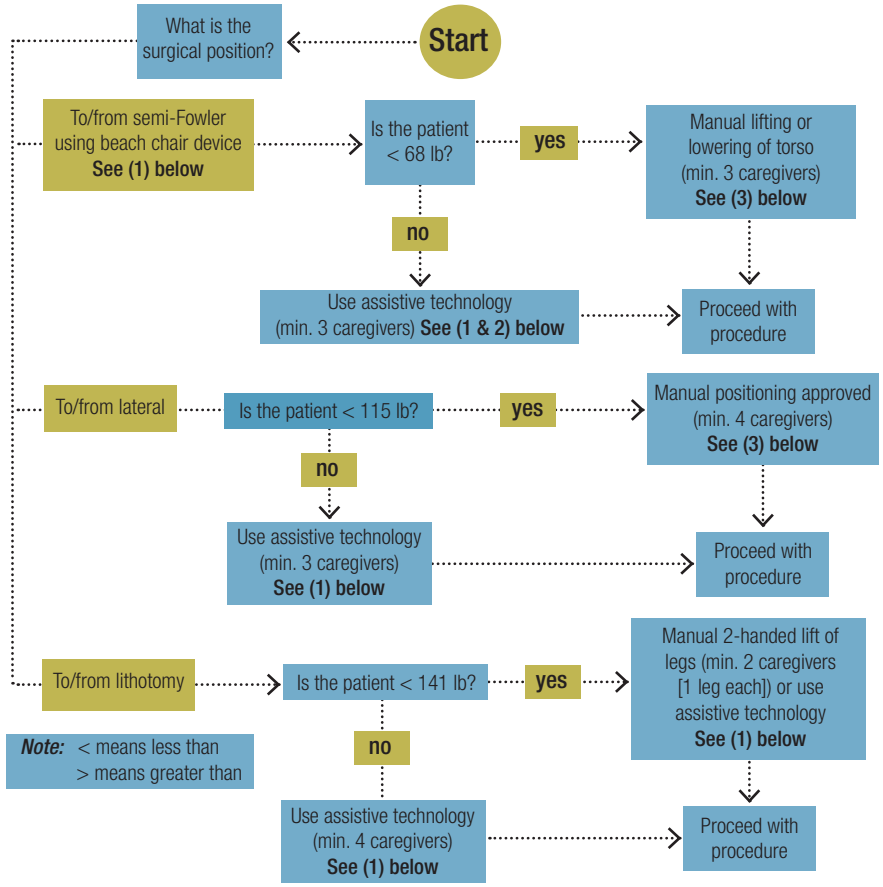
- Weight < 68 lb
  - Manual lifting or lowering of torso—minimum of 3 caregivers
- Weight > 68 lb
  - Use assistive technology—minimum of 3 caregivers

Position patient into and from the lateral position

- Anesthesiologist supports head and neck
- Requires push/pull forces rather than lifting
- Weight < 115 lb
  - Manual positioning approved—minimum of 4 caregivers
- Weight > 115 lb
  - Use assistive technology—minimum of 3 caregivers

Position patient into and from the lithotomy position

- Weight < 141 lb
  - Manual two-handed lift of legs–2 caregivers–1 leg each or use assistive technology
- Weight > 141 lb
  - Use assistive technology or minimum of 4 caregivers–2 to lift each leg



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 an electric table, if available.
3. One of these caregivers could be the anesthesia professional to hold the head and maintain the airway.

- During any patient handling task, if any caregiver is required to lift more than 35 lb 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 transfer is not included because this is assumed to be a function of the table.

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

Potential Risk Factors:

- Excessive reaching
- Bending
- Awkward posture/position
- Excessive load

Location of Risk/Impact of Task:

- Back
- Shoulders
- Hands
- Knees

Essential Task Elements:

Support the patient's extremity or head to protect from injury.

Task Recommendations:

- Minimize risk of muscle fatigue and potential for musculoskeletal disorders.
- Be familiar with shaded and non-shaded areas for guidance to lift and/or hold the appropriate body part for a particular period of time.
- Respect time limits.
- Use clinical judgment to assess the need for additional caregiver assistance or assistive devices.

Patient Weight	Body Part	Body Part Weight	Lift 1-Hand	Lift 2-Hand	Hold 2-Hand <1 min	Hold 2-Hand <2 min	Hold 2-Hand <3 min
≤ 40 lb (≤ 18kg)	Leg	< 6 lb < 3 kg					
	Arm	< 2 lb < 1 kg					
	Head	< 3 lb < 1 kg					
40-90 lb (18-41 kg)	Leg	< 14 lb < 6 kg					
	Arm	< 5 lb < 2 kg					
	Head	< 8 lb < 4 kg					
90-140 lb (41-64 kg)	Leg	< 22 lb < 10 kg					
	Arm	< 7 lb < 3 kg					
	Head	< 12 lb < 6 kg					
140-190 lb (64-86 kg)	Leg	< 30 lb < 14 kg					
	Arm	< 10 lb < 4 kg					
	Head	< 16 lb < 7 kg					
190-240lb (109-127 kg)	Leg	< 38 lb < 17 kg					
	Arm	< 12 lb < 6 kg					
	Head	< 20 lb < 9 kg					
240-290lb (109-132 kg)	Leg	< 46 lb < 21 kg					
	Arm	< 15 lb < 7 kg					
	Head	< 24 lb < 11 kg					
290-340 lb (132-155 kg)	Leg	< 53 lb < 24 kg					
	Arm	< 17 lb < 8 kg					
	Head	< 29 lb < 13 kg					
340-390lb (155-177kg)	Leg	< 61 lb < 28 kg					
	Arm	< 20 lb < 9 kg					
	Head	< 33 lb < 15 kg					
390-440 lb (177-200 kg)	Leg	< 69 lb < 31 kg					
	Arm	< 22 lb < 10 kg					
	Head	< 37 lb < 17 kg					
>440 lb (>200 kg)	Leg	> 69 lb < 31 kg					
	Arm	> 22 lb < 10 kg					
	Head	> 37 lb < 17 kg					

No Shading: OK to lift and hold; use clinical judgement and do not hold longer than noted.
Heavy Shading: Do not lift alone; use assistive device or more than one caregiver.

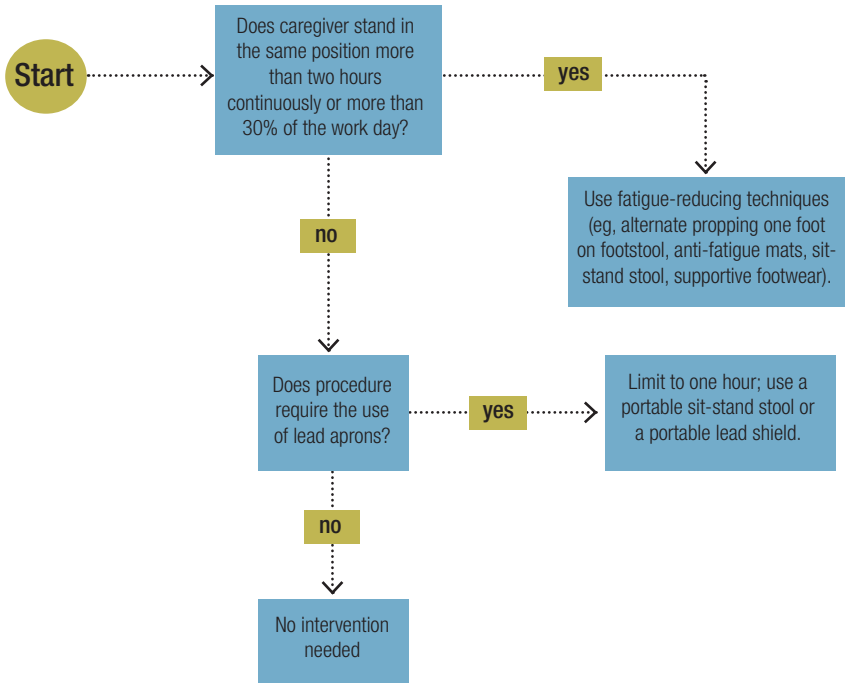
Ergonomic Tool #4: Prolonged Standing

Potential Risk Factors:
- Awkward posture/position
- Long duration (resulting in excessive static loading)

Location of Risk/Impact of Task:
- Back
- Neck
- Knees
- Legs
- Feet

Essential Task Elements:
The focus is on the sterile perioperative team members who are standing with a static posture for long periods of time.

Task Recommendations:
- Wear supportive, comfortable, and closed-toe footwear
- Wear support stockings/socks
- Use fatigue-reducing techniques (eg, alternate propping one foot on footstand, anti-fatigue mat)
- Be aware of neck flexion greater than 30 degrees or rotation for more than one minute uninterrupted
- Take rest breaks or reposition when possible
- Be at optimal working height/posture
- Use lightweight lead aprons and two-piece style
- Consider a sit-stand stool
  -Maintain level of sterility



General Recommendations
- Caregiver should wear supportive footwear that:
  - does not change the shape of the foot;
  - has enough space to move toes;
  - has shock-absorbing, cushioned insoles;
  - has closed toe; and
  - has height 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 caregivers will not be changing levels during the procedure.*
- Be aware of infection control issues for nondisposable and anti-fatigue matting.
- Accommodations for pregnancy were considered, but the two-hour limit on prolonged standing covers this condition.
- Scrubbed staff should not work with the neck flexed more than 30 degrees or rotated for more than one minute uninterrupted.
- Two-piece, lightweight lead aprons are recommended.
- During the sit-to-stand break, staff should look straight ahead for a short while.

* Recommended practices for sterile technique. In: Perioperative Standards and Recommended Practices. Denver, CO: AORN, Inc; 2013

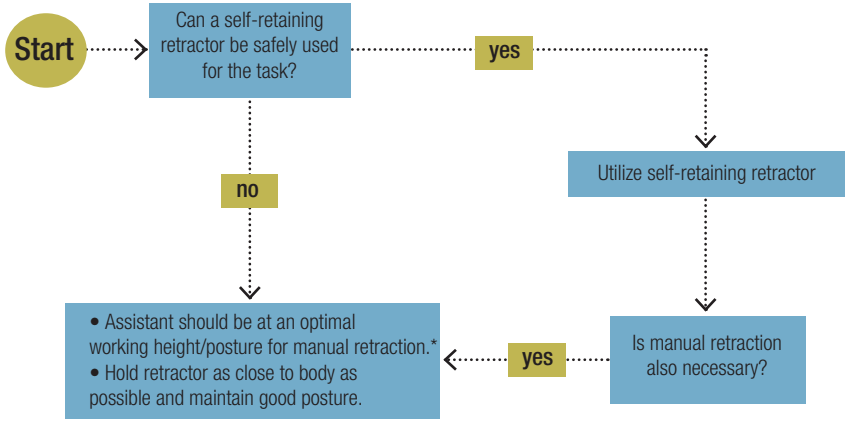
Ergonomic Tool # 5: Retraction

Potential Risk Factors:
- Excessive reaching
- Pushing or pulling
- Bending
- Awkward posture/position
- Excessive static load

Location of Risk/Impact of Task:
- Hands
- Arms
- Shoulders
- Back

Essential Task Elements:
The focus is on the sterile perioperative team member who are using retractors or performing manual retraction.

Task Recommendations:
- Consider the use of self-retaining retractor for task.
- Be at optimal working height/posture.
- Hold the retractor as close to your body as possible and maintain good posture.
- Avoid using hands as retractors to reduce risk of sharps injury.
- Take rest breaks or reposition when possible.
- Use arm rests when device is available.
  - -Do not use the patient as an arm rest.



- Arm rests should be utilized 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. Since this is a high-risk task, caregivers 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.

* Optimal working height which is defined as the surgical field or the working area located between the team member's chest and waist. 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.

Ergonomic Tool #6: Lifting and Carrying Supplies and Equipment

Potential Risk Factors:

- Excessive reaching
- Pushing or pulling
- Bending
- Awkward posture/position
- Excessive static load

Location of Risk/Impact of Task:

- Lower back
- Shoulders
- Wrists
- Knees

Essential Task Elements:

The focus is on activities of perioperative team members during set-up, throughout the procedure, and at the conclusion of the procedure.

Task Recommendations:

- Consider factors that affect lifting (eg, weight of load, location or height of lift including vertical lift characteristics, horizontal distance from body, coupling characteristics, twisting, frequency, etc.).
- Know what assistive devices are available, and where they are located in the practice setting, and insist on using them.
- Keep instrument tray weights at or below 25 lb.

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 (two—one in each hand)	1.4	
Wilson frame	1.4	
Irrigation containers for lithotripsy (12,000 mL)	1.5	
Instrument pans	2.0	

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 the weight should be reduced.

Ergonomic Tool #7: Pushing, Pulling, and Moving Equipment on Wheels

Potential Risk Factors:

- Excessive reaching
- Pushing or pulling
- Bending
- Awkward posture/position
- Excessive load

Location of Risk/Impact of Task:

- Back
- Shoulders
- Hands
- Knees

Essential Task Elements:

The focus is on activities of perioperative team members during set-up, throughout the procedure, and at the conclusion of the procedure.

Task Recommendations:

- Opt for pushing tasks over pulling tasks.
- Push at a comfortable "middle" height – about 3 feet for average height.
- If push force limits are exceeded.
    - Reduce weight of load.
    - Use 2 or more caregivers to complete task together.
    - Use powered transport device.
- Keep casters/wheels clean and well maintained to assist in moving equipment more easily.

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

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 the weight should be reduced.