Safe Patient Handling and Movement Series

AORN Ergonomic Tool 2:

Positioning and Repositioning the Supine Patient on the OR Bed

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ABSTRACT

Positioning or repositioning a patient on the OR bed in preparation for a surgical procedure presents a high risk for musculoskeletal disorders, such as low-back and shoulder injuries, for perioperative personnel. Safe patient handling requires knowledge of current ergonomic safety concepts, scientific evidence, and equipment and devices to ensure that neither the patient nor the caregiver is at risk for injury. AORN Ergonomic Tool 2: Positioning and Repositioning the Supine Patient on the OR Bed provides guidelines that enable perioperative personnel to determine safe methods for positioning and repositioning a patient in the semi-Fowler, lateral, or lithotomy position in preparation for surgery. *AORN J* 93 (April 2011) 445-449. Published by Elsevier Inc. on behalf of AORN, Inc. doi: 10.1016/j.aorn.2010.08.027

Key words: *musculoskeletal disorders, safe patient handling, perioperative patient positioning, ergonomics, workplace safety.*

Editor's note: *This is the second in a series of seven articles based on the "AORN guidance statement: Safe patient handling and movement in the perioperative setting." These articles describe specific ergonomic solutions for high-risk patient handling tasks in the perioperative clinical setting.*

The act of properly positioning a patient for a surgical procedure after he or she has been moved from the transport stretcher or gurney into the supine position on the OR bed often requires application of high levels of lifting, pushing, or pulling force. These high levels of force are sufficient to cause injury to the low back and shoulders of the caregiver who must perform these movements.

AORN's "Recommended practices for positioning the patient in the perioperative practice setting" states that the perioperative nurse should actively participate in monitoring patient body alignment and tissue integrity based on sound physiologic principles,[1] and "inadequate numbers of personnel and/or equipment can

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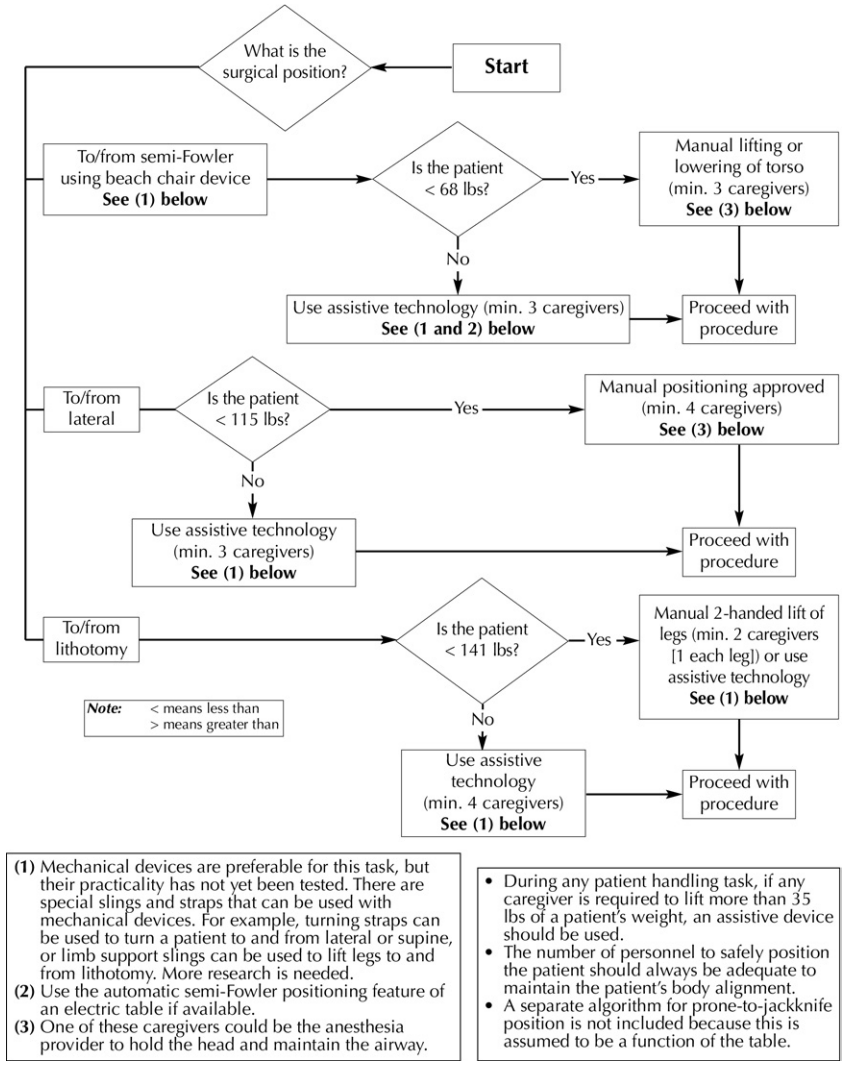

Figure 1. Ergonomic Tool 2: Positioning and Repositioning the Patient on the OR Bed Into and From the Supine Position.

result in patient or personnel injury."[1(p344)] Protection of the patient in the OR is of utmost concern, however, protection of perioperative personnel also must be considered. It is recommended, therefore, that no caregiver ever manually lift more than 35 lb of a patient's weight.[2] Ergonomic Tool 2: Positioning and Repositioning the Supine Patient on the OR Bed (Figure 1) provides guidelines to assist perioperative RNs and other team members in positioning and repositioning the patient on the OR bed in a manner that is safe for the patient and the team members.

ERGONOMIC TOOL 2

The first step of the algorithm requires the nurse to determine the appropriate surgical positioning needed and whether it involves moving the patient into or from

- a semi-Fowler position by using a beach chair device,
- a lateral position on the OR bed, or
- the lithotomy position.

The algorithm then requires the nurse to determine, based on the patient's weight, the number of personnel required to safely accomplish the

move. In some circumstances, manual positioning is acceptable, and, in some instances, such as with a heavier patient or one who must be moved a significant distance or moved from one level to another, the use of assistive devices to move the patient is recommended.

Semi-Fowler Position

If the patient weighs less than 68 lb (30.5 kg), then moving and positioning the patient to or from the semi-Fowler position can be performed manually with a minimum of three caregivers. If the patient weighs 68 lb or more, then assistive technology and a minimum of three caregivers are needed to perform the positioning activity safely.

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Rationale. The mass of a patient's body from the waist up, including his or her head, neck, and upper extremities, equals 68.6% of total body weight.[3] For the purpose of transfer planning, the estimated weight of the equipment (20 lb [9.1 kg]) must be added to this. To accommodate at least 75% of the US adult female working population, the maximum load for a caregiver to perform a two-handed lift with his or her arms fully extended is 22.2 lb (10.1 kg). This is determined on the basis of 25th percentile of US adult female shoulder strength capabilities[3] and 75th percentile US adult female arm length.[4] Therefore, three caregivers together could lift up to 66.6 lb (30.3 kg). This equates to a 68-lb (30.9-kg) patient (66.6 lb [maximum weight for three caregivers] minus 20 lb [equipment weight] divided by 0.686). If the patient weighs more than 68 lb, a minimum of three caregivers using mechanical devices is preferable. An example of an appropriate device is the automatic, semi-Fowler positioning mechanism of an electric OR bed. Further research to address gaps in technology is recommended.

Lateral Position

If the patient weighs less than 115 lb (52.2 kg), then moving and positioning the patient to or from the lateral position can be performed manually with a minimum of four caregivers. If the patient weighs 115 lb or more, then assistive technology and a minimum of three caregivers are needed to perform the positioning activity.

Rationale. Positioning or repositioning a patient into or out of a lateral position involves pushing and pulling forces rather than lifting forces. If one caregiver or anesthesia care provider supports the patient's head and neck (ie, 8.4% of the patient's body weight) during lateral positioning, then the patient's remaining body mass equals 91.6% of total body mass.[3] According to tables developed by Liberty Mutual, for a pulling distance of 6.9 ft (2.1 m) or less, with a pull point (ie, the starting position of the caregiver's hands) between the caregiver's waist height and nipple line and a performance frequency rate of no more than once every 30 minutes, the maximum initial force equals 57 lb (26 kg) and maximum sustained force equals 35 lb (16 kg).[5] Therefore, with an anesthesia care provider to maintain the patient's airway, two caregivers can safely position a patient who weighs up to 76 lb (34.5 kg) (ie, 35 lb multiplied by 2 care providers divided by 0.916). Three caregivers and an anesthesia care provider can safely position a patient weighing up to 115 lb (ie, 35 lb multiplied by 3 care providers divided by 0.916). If the patient weight exceeds 115 lb, then lateral positioning devices are needed to safely perform the task.

Further research is needed to enhance development of technology for this task.

Lithotomy Position

If the patient weighs less than 141 lb (64.1 kg), then moving and positioning the patient to or from the lithotomy position can be performed manually with a two-handed lift of the patient's legs by a minimum of two caregivers, one for each leg. If the patient weighs 141 lb or more, then assistive technology or a minimum of four caregivers are needed to perform the positioning activity.

For lifting and holding limbs, the maximum load for a two-handed lift is 22.2 lb.[3] Each complete lower extremity (ie, thigh, calf, foot) accounts for 15.7% of the patient's total body mass.[3] Therefore, one caregiver can safely lift one leg with two hands if the patient weighs 141 lb or less because each leg is estimated to weigh 22.2 lb or less (141 lb multiplied by 0.157). Caregivers attempting to lift two legs, one in each hand at the same time, however, would only be able to perform this task if the patient weighed 70.5 lb (32 kg) or less. Lifting the legs of a patient weighing more than 141 lb, even with two hands, requires use of assistive technology or four caregivers (two to lift each leg). A mechanical device such as a support sling would be useful for lifting the legs to and from the lithotomy position. Similarly, a specially designed OR bed may be needed. Further research is needed to enhance the availability of technology to be used for this task.[6]

CONCLUSION

The extended reach and excessive weight lifted during patient positioning require the use of large muscle forces. These forces are large enough to cause damage to the spinal tissues, which could result in severe low-back or shoulder pain and could lead to permanent disability. Therefore, it is important to determine which tasks may be safe to perform manually and which should be performed with the assistance of technology, such as patient-lifting devices and other ergonomic equipment. AORN Ergonomic Tool 2 for assessing the task of positioning or repositioning a patient on an OR bed for a surgical procedure provides a user-friendly guideline for making such a determination. As with the use of any ergonomic tool, however, care providers should continue to rely on their professional experience when making decisions. AORN

Editor's note: *The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health or the Veterans Health Administration.*

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