



Patient Positioning for Surgical Procedures

EVIDENCE INFORMED PRACTICE TOOLS

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1. PURPOSE AND INTENT

PURPOSE:

- To provide a practical guideline for intraoperative positioning practices to members of the surgical team (nurses, physicians, anesthesiologists, and other members of the surgical team).
- To provide optimal exposure and access to the surgical site(s) taking into consideration requirements for skin prep, draping, surgical approach, and type of anesthetic administration. Consideration should also be given to access of IV sites and anesthesia support devices.
- To use optimal intraoperative positioning while supporting patients' respiratory and circulatory function.
- To maintain patient comfort, dignity, and minimize risk of positioning related injuries to the patient.
- To promote safe work practices to prevent or minimize injury to Health Care Workers (HCW) during patient handling tasks (repositioning, transferring, lifting/holding limbs, etc.)

INTENT:

To provide healthcare teams guidance, information and a consistent approach to consider regarding the use Patient Positioning for Surgical Procedures within the Winnipeg Regional Health Authority (WRHA).

2. Guidelines

A) Safe Patient Handling

Safe positioning/transfer of the patient requires involvement and coordination of all surgical team members. The surgical team should ensure that there are adequate personnel available to position/transfer the patient safely and that all personnel understand the Safe Work Procedures that will be used. The attending anesthesiologist or their designate leads the team in transferring the patient.

Rationale:

- Ensures the airway and other support devices remain intact throughout positioning.
- Prevents injury to the patient and HCW.

Refer to the [WRHA Safe Patient Handling and Movement Program and Operational Procedures](#) for a standardized, evidence-based best practice approach to safe patient handling and movement. Basic principles of safe patient handling include (but are not limited to) the following:

- Use assistive devices when required (ex. If lifting greater than 35 lbs. of a patient's weight during any patient transfer task).
- Use assistive device if required to lift and hold a limb that weighs > 11.1 lbs. (one-handed lift) or > 22.2 lbs. (two-handed lift).

- Where assistive devices are not available, the appropriate number of HCW's to perform the patient handling task safely should be available.
- Height of receiving surface should be adjusted slightly lower than initial surface, at waist height of the shortest worker.

B) Transfer Guidelines

Use friction reducing devices (FRD's) for lateral transfers on/off the OR table. FRD's that extend the full length of the bed should be used where possible, especially for bariatric patients.

- For awake and alert patients weighing < 100 lbs. use (at minimum) 2 HCW's.
- For awake and alert patients who weigh between 100-200 lbs., use (at minimum) 2-3 HCW's.
- For awake and alert patients who weigh between 200-500 lbs., use (at minimum) 3-4 HCW's.
- For bariatric patients (> 350 lbs.) use at least 4 HCW's. If available, use a mechanical lateral transfer device, or air-assisted friction-reducing device (ex. Hover Mat).
- A minimum of 4 HCW's should be used for roller board transfers.

3. Patient Assessment

A) Preoperative Patient Assessment

Assess the patient for risk of surgical positioning injury. Risk factors that may require additional precautions during positioning include, but are not limited to:

- Age greater than 65 years.
- Pediatric/premature patients.
- Malnourished (obese, thin, low serum protein, NPO or clear fluids > 5 days).
- Pre-existing conditions (vascular, respiratory, circulatory, and/or immunocompromised).
- Chronic disease such as diabetes mellitus and anemia.
- Mobility limitations.
- Neurological conditions.
- Incontinence (increased exposure to moisture/feces).
- Sensory deficit.
- Patients taking steroid medication.
- Impaired temperature regulation.
- Presence of edema, infection, existing and/or previous pressure ulcers or cancer.
- Significant postural asymmetries.
- Demineralizing bone conditions (i.e. osteoporosis).
- Medical devices (i.e. immobilizers, splints, braces, catheters, tubes).
- Altered skin conditions (e.g. decreased turgor, cool temperature, excessive moisture, poor integrity, etc.).
- Patients whose surgical procedure
 - Is scheduled or anticipated to be greater than 2.5 hours duration.
 - Includes more than one procedure type (**Rationale:** increases operative time).

- Is an abdominal, non-cardiac thoracic, or an orthopedic procedure that requires administering a general anesthetic (**Rationale:** results in vasodilation, hypotension, and subsequently reduced tissue perfusion).
- Requires lengthy time in lithotomy or prone position.
- Results in excessive pressure related to retraction.
- Increases the risk of hypotensive, hypovolemic, and hypoxic episodes.
- Increases the risk of unstable blood sugars (e.g. hyperglycemic).

Perform a head-to-toe assessment of vulnerable areas including but not limited to:

- Skin condition (color, turgor, integrity, temperature, moisture). Make note of any reddened areas, rashes, wounds, blisters, dry skin, bleeding, swelling, excoriation in skin folds, and pre-existing pressure injury.
- Temporal and occiput region of the skull.
- Ears.
- Scapulae.
- Spinous processes.
- Shoulders.
- Elbows.
- Sacrum/coccyx.
- Femoral trochanters.
- Knees
- Heels.
- Toes.
- Parts of body in contact with devices such as tape, tubes, restraints, etc.
- Between skin folds.
- Areas of the body covered by anti-embolic stockings.
- Prostheses and/or implants and/or other medical devices (e.g. vascular access devices, catheters, drains) and/or ostomies that may interfere with proper positioning.
- Other factors that may impact surgical positioning.

Jewelry, body piercings, etc. shall be removed if possible. (**Rationale:** Jewelry and piercings may interfere with airway management, cause pressure injuries, electrosurgical burns, or cause injury during transfer by catching on linen or operating room devices.)

B) Postoperative Patient Assessment

- Perform postoperative skin assessment including all affected bony prominences from the positioning, before leaving the perioperative suite.
- Wet or soiled garments or incontinent products should be promptly removed from the skin. (**Rationale:** prolonged exposure of skin to urine, fecal matter, and perspiration increases skin's permeability and susceptibility to bacteria and breakdown.)
- Conduct wound assessment and care, if any skin injuries noted. (See Appendix A).
- When patient is alert/awake perform neurological assessment including any signs and symptoms of pain, numbness, tingling, or loss of sensation, if possible, and after the

patient has recovered from the anesthetic. (Note: this may be done in the post-operative area by the recovery room nurse or anesthesiologist.)

- Ensure positioning related concerns are communicated during the handover report to the receiving unit nurses. Elements to communicate may include, but are not limited to:
 - Potential risk factors that may affect the development of pressure injuries, length of procedure, pressure points noted, etc.).
 - Any pre-existing and newly developed wounds.
 - Positioning related injuries, details from assessment, and any interventions performed.
 - General hemodynamic status of the patient intraoperatively (e.g. hypo/hypertensive, hypoxic, hypovolemic, unstable blood sugars, etc.).

C) Documentation

Includes, but is not limited to:

- Preoperative assessment of skin integrity including relevant abnormalities of skin condition on arrival to the perioperative suite.
- Patient position and any new position(s) if repositioned.
- Type and location of positioning equipment/devices including table attachments, padding, pillows, safety straps.
- Extremity positioning.
- Eye padding/protection.
- Confirmation of checking of vulnerable structures and any implemented interventions.
- Frequency of any passive range of motion exercises performed.
- Frequency of any limb assessments, any abnormal findings and subsequent actions taken.
- Team approval and consensus of final patient position.
- Name and title of persons participating in positioning.
- Any system assessment/evaluation and post-operative assessment of the patient for injury related to positioning including all areas that were padded.
- Documentation of an event related to positioning including, but not limited to:
 - Description of what happened.
 - Date and time of the incident.
 - Location of the incident.
 - Witnesses.
 - Corrective action to be implemented.
 - Communications regarding the outcome.

D) Wound Management

If the patient presents with a pre-existing wound or skin injury that is currently being treated/managed by a wound care clinician/team, leave the dressing in-situ. If the pre-existing wound or skin injury is part of /within the surgical field, or the existing dressing is heavily soiled, assess and manage the wound accordingly (see Appendix A).

If the patient presents with a new wound or skin injury preoperatively or postoperatively, assess and manage the wound accordingly (see Appendix A).

4. Positioning the Patient

A) Prior to the Surgical Procedure

Note: Verify the correct patient position before positioning begins.

Determine the necessary surgical equipment (i.e. Operating Room (OR) table and positioning device(s)) that will be required and ensure the device(s) is available in the appropriate size and/or weight capacity and in working order.

- Only use devices made for use as positioning aides when positioning a patient/client.
- Follow manufacturer's instruction for use and for cleaning of positioning equipment and devices.
- Select appropriate positioning equipment and devices suited to the patient population. Factors to consider include, but are not limited to:
 - Radiolucency.
 - Ability to provide maximum support with minimal pressure.
 - Resistance to moisture.
 - Non-flammable.
- Use tape cautiously as removal of tape can cause skin stripping and/or blisters.
- The patient's body should be protected from coming into contact with metal surfaces of the OR table or positioning devices. (Rationale: Edges of positioning devices may cause pressure that could lead to skin breakdown.)

B) During Positioning

Maintain patient privacy and limit exposure.

- Keep windows covered and doors closed.
- Restrict or limit access to theatre to authorized personnel only.
- Expose only the areas of the patient's body necessary to provide care or access to the surgical site.

To maintain the safety of the patient, the following steps should be taken:

- A team member shall stand on either side of the patient until the safety strap is secured.
- Maintain patient's normal anatomical alignment based on preoperative assessment.
- Prevent shearing and friction forces, or accumulation of moisture under the patient.
- Consider using a pressure redistribution mattress for all patients at risk of developing pressure ulcers or for procedures lasting greater than 2.5 hours.
 - Avoid folds or creases in sheets and excessive layers (**Rationale:** each additional layer will decrease the pressure redistribution capabilities of the mattress or positioning device.)
 - Prophylactic padding and/or dressing may be applied to bony prominences (e.g. heels, sacrum) or other areas subjected to pressure, friction, and shear. (**Rationale:** compression against the patient during the procedure, could lead to skin breakdown.)

- Place padding between the patient and lines (catheters, EKG leads, IV's etc.) to minimize pressure points during the procedure. (Rationale: Gel and air pads have been shown to decrease pressure ulcer risk in patients undergoing prolonged surgical procedures. Pillows and molded foam devices are less effective during long procedures.)
- Rolling Patients (for lateral or prone positions):
 - Follow Safe Patient Transfer Guidelines in section 2.
 - A minimum of 4 HCW's is required for this task (one pusher, two pullers, and anesthesia care provider at head).

C) After Positioning is Complete

Collaborate with the surgeon and anesthesia care provider to assess patient status, including, but not limited to: respiratory, circulatory, neurological, musculoskeletal, and integumentary.

- Confirm that the airway remains patent throughout positioning.
- Confirm that the patient's eyes are not compressed; collaborate with anesthesia in regards to appropriate eye protection.
 - Protect eyes with non-allergenic tape, pads, goggles, or corneal shields as appropriate. Lubricate with ophthalmic gel as applicable.
- Confirm that the surgeon will have an optimal view/access to the surgical site.
- If the position of the patient and surgical site allows, secure a safety strap 2" above the knee ensuring the ability to pass a flat hand or two (2) fingers between the safety strap and the patient. Place a blanket/padding between safety strap and patient's skin. Reassess after each positional change or addition of extra padding. (**Rationale:** Prevents nerve compression injury and compromised blood flow.)
- Confirm that there is sufficient access to all lines and catheters intra-operatively.
- Confirm that there is no kinking or excessive tension on lines and catheters.
- Allow for a 2-3" clearance from equipment placed above patient e.g. Mayo stand.
- Check that the sequential compression device is functioning and the tubing is unobstructed after positioning.
- Confirm that the patient's body alignment is appropriate.
- Confirm no part of the patient body is in contact with metal parts of the OR bed, or other devices/equipment.
- Confirm/communicate any repositioning requirements during the briefing or time-out phase of the surgical safety checklist.

D) Intraoperatively

Note: Do not lean on the patient. Be cautious if placing instrumentation and/or devices on patient's body.

- In collaboration with the surgical team, determine the appropriate time to perform a limb assessment (e.g. capillary refill, presence of pulse, warmth, color, patent intravenous lines, etc.). Ideally a limb assessment should be performed every hour of the surgical procedure. Care should be taken to avoid compromising the sterile field.

- Upon discovery of an injury (or potential injury) to a patient, the team is notified, appropriate action is taken (e.g. repositioning if possible), and details are documented.
- Ensure patient's hands, fingers, feet/toes, and genitals are in a position that is clear of OR bed breaks, sources of compression, or other potential hazards.
- Verify placement/tightness of safety straps during positioning activities.

5. Positioning of Limbs

A) Arms Extended:

- Ensure arm board padding is at the same level as the table mattress.
- Position arm on the arm board ensuring arm is extended less than 90 degrees from patient's side to avoid compression of the brachial plexus.
- Place arm in supinated or neutral position to decrease pressure on ulnar nerves.
- Place padding under the elbows.
- If, due to stiffness or contracture, the arm does not lie flat on the arm board, bolster the distal portion of the arm with an appropriate padding to provide support.
- Secure arm loosely to arm board using an appropriately sized, soft, non-occlusive wrist/arm strap.

B) Arms at side

- Support, protect and secure the full length of the arm using an arm protector (as applicable).
- The patient's elbows and hands may be protected with extra padding.
- The draw sheet should be pulled up between the patient's body and arm, placed over the patient's arm, and tucked securely (but not too tightly) between the patient and the OR bed.
- The draw sheet should extend from the mid upper arm to the fingertips.
- Patient's elbows should be slightly flexed; wrists in neutral position; palms facing inward.
- Patient's fingers should be in a position that is clear of the breaks in the OR bed or other hazards.

C) Arms flexed

- Flexed and secured across the body, with draw sheet or tape.
- Elbows should be padded and protected.
- Ensure IV lines and monitors are not kinked or trapped between the arm and the patient's body.

D) Heels

If possible distribute the weight of the leg along the calves so the heels are completely elevated from OR table. A pillow or air based pressure reducing "boot" device may be used to off-set the pressure from the heels.

6. Supine and Variations

A) Basic Supine Position

Risks:

- Pressure causing injury to the head, eyes, scapulae, elbows, back/spinous processes, sacrum, coccyx, toes, and heels.
- Injury to peripheral vessels and nerves including, but not limited to:
 - Brachial plexus.
 - Ulnar nerve.
 - Tibial nerve.
 - Peroneal nerve.

Positioning devices/resources may include:

- Pillows (available).
- Foot board/extension (available for tall patients).
- Self-locking arm board.
- Arm Protector (if arms placed at patient side).
- Safety strap.
- Securing devices for arm boards.
- Vacuum packed positioning device (i.e. bean bag positioner).
- Padding (Gels or Jutes).

Positioning the patient:

- Place head on small pillow or gel headrest.
- Place small pillow, gel or foam positioning pad(s) under the popliteal area.
Rationale: Relieves pressure on the spine and lower back, and hyperextension of the knees, heels and feet.
Note: Donuts headrests should not be used in supine position as they increase pressure adjacent to the area one is trying to offload.

Knees, heels and feet:

- Place pillow under full length of the calf and keep the knee in slight flexion to offload or free float the heels, if required. (**Rationale:** Increases perfusion and helps prevent pressure injury to heels.)
- Uncross ankles and legs.
- Consider a foot extension for tall patients.
- Consider supporting the soles with a pillow or padded footboard. (**Rationale:** prevents prolonged plantar flexion and nerve stretch injury.)

B) Minor Variations on the Supine Position

Shoulder or anterolateral procedures:

- Place a gel roll under the affected side.
- Stabilize the length of the body to prevent the spine from rolling or twisting.

- Keep hips and shoulders in a straight plane.

Shoulder/bridge (Thyroid elevator):

- Use a gel roll placed transversely under shoulders to provide hyperextension.
- A perpendicular roll can be placed between shoulders causing shoulders to fall back bilaterally, elevating sternum.

Frog Leg:

- Place blanket over lower legs.
- Place safety strap anterior to the shins.
- Pillows may be placed under knees for support and to off load pressure from the lateral malleoli.

C) Sitting (Beach Chair)

Risks:

- Pressure to scapulae, sacrum, coccyx, ischial tuberosities, back of knees (popliteal fossa), and heels.
- Air embolism if venous sinus is opened.
- Shearing.
- DVT in lower extremities.
- Venous pooling shifts toward lower body.
- Hypotension related to the position.
- Compressive peripheral neuropathy.
- For additional risks see Cranial and Spinal Surgery.

Positioning the patient:

- Attach the Beach Chair positioner to the OR table according to the manufacturer's instruction.
- In the sitting position the buttocks should be placed against the lower back of the Beach Chair positioner.
- Two Head Sets available:
 - Intubation pad – only to be used for intubation then removed and replaced with headrest.
 - Headrest – may be used for both intubation and the surgical procedure. It provides stability of the head and keeps the airway in the neutral position. After induction a padded mask (tenet face mask) is placed over the patient's face and tightened to secure the head and reduce undue stress on the neck. Make certain no pressure is on the eyes and that the pressure is equal over all areas of the face. Make certain that there is no pressure on the neck to prevent jugular vein and carotid artery compression.
- Arms:
 - During intubation – place inside the lateral rests with palms facing the body.
 - After intubation – non operative arm is placed and secured on a padded raised arm board.

- Lateral supports – provide lateral stability, so when the surgeon pulls on the operative arm the head and body will remain in the initial position.
- Legs:
 - The knee bolster (wedge) prevents the body from slipping down the OR table. A knee strap is used to secure the patient’s legs.
 - A foot board may be used to prevent foot drop.
 - Compression stockings or sequential compression can be used to optimize venous circulation.
- All pressure points are padded with special attention to the ischial tuberosities and sacrum.

D) Fracture Table

Risks:

- Pressure points include but not limited to:
 - Head.
 - Scapulae.
 - Elbows.
 - Back/Spinous Processes.
 - Sacrum.
 - Coccyx.
 - Heels.
 - Foot and ankle (including malleoli) in traction.
 - Genitalia.
 - Peripheral vessels and nerves including, but not limited to:
 - Brachial plexus.
 - Ulnar nerves.
 - Perineal nerve.
 - Pudendal nerve.
- Positioning devices/resources may include:
 - Small pillow or gel donut head rest.
 - Self-locking arm board (as applicable).
 - Securing devices for arm board and for securing arm on unaffected side.
 - Safety strap.
 - Padding as appropriate to the length of the procedure.

Positioning the patient:

- Perineal post:
 - Position the patient in the supine position on the table with the pelvis stabilized against a well-padded perineal post which has been placed between the genitalia and the uninjured leg. Ensure pressure is not placed on the genitalia, perineal and pudendal nerves. (**Rationale:** the intense pressure placed on the pelvis when traction is applied to the injured leg increases

pressure on the genitalia, perineal and pudendal nerves which can cause fecal incontinence and loss of perineal sensation.)

- Legs:
 - The unaffected leg is raised, abducted and supported on a padded leg rest (stirrup).
 - The injured leg is extended and is held by a well-padded boot or combination of boot and straps. (**Rationale:** excessive pressure placed on the foot and ankle causes pressure on the heel and uneven distribution of the weight.)
 - Check the distal lower extremity before, during, and after this position.
- Arms:
 - Rest the arm on the operative side on the patient's chest and secure the arm appropriately. Avoid pressure on the ulnar nerve.
 - If a supporting arm holder is used, ensure the post and arm holder are distal to the elbow, freeing the cubital tunnel from pressure.
- Place a safety strap across the patient's upper body.

E) Trendelenburg

Risks:

- As per supine, lithotomy, lateral or prone as applicable.
- Increased risk of compartment syndrome, & tissue injury.
- Increase risk of inaccurate physiological monitoring (BP, IV, arterial line).
- Increased risk of diminished lung capacity.
- Increased risk of venous pooling shifts toward head.
- Sliding and shearing.
- **OR table should not be tilted more than 40 degrees downward at head.** May result in:
 - Pulmonary and cardiovascular changes.
 - Diaphragmatic movement can be limited severely by the weight of the abdominal viscera.
 - Increased intracranial pressure.
 - Increased intraocular pressure, postoperative vision loss.
 - Passive regurgitation.

NOTE: for prolonged procedures the nurse should communicate with the anesthetic team and surgeon every two hours to assess the need to reposition the patient.

Positioning the patient:

- Follow Safe Patient Handling Guidelines under 2.4.
- Use of a vacuum packed positioning device or placing the patient directly on a gel overlay (without a sheet) can help prevent sliding. If draw sheet is required to move the patient, place under gel mat. (**Rationale:** To decrease risk of shearing injury).
- Patient's body should not be in contact with any metal portions of the procedure bed.
- Place additional straps (padded) across the chest to further secure the patient.
- Arms:

- Tucking and/or securing the arms at the sides will reduce the potential for patient injury.
- If arms are extended, amount of the incline in Trendelenburg position should be limited to less than 30 degrees.
- **DO NOT** use shoulder braces or wrist straps.
- Knees must be bent with the break of the operating room table. (Rationale: prevent pressure on the peroneal nerves and veins in lower extremities. Mechanism of injury to lower extremity nerves: femoral, lateral femoral cutaneous, obturator, sciatic, common peroneal nerves, is due to compression and stretching.)

F) Reverse Trendelenburg

Risks:

- As per supine.
- Deep vein thrombosis (DVT) in lower extremities.
- Sliding and shearing.
- Injury to peroneal nerve.
- Increased venous pooling can result in hypotension.
- Decreased cardiac return; potential for circulatory overload if positioned back to supine too quickly.

Positioning the patient:

- Follow Safe Patient Handling Guidelines under 2.4.
- Attach a padded footboard to the OR bed to prevent sliding and shearing (be attentive to heel pressure when patients have vascular and sensory compromise).
- Knees are flexed slightly to counteract sliding.
- Compression stockings/sequential compression sleeves can be used to optimize venous circulation.
- Opposite of Trendelenburg position.

Other consideration:

- Obese patient:
 - “Head up” position is associated with weight moving downward; therefore a well-padded foot board should be used to prevent the patient from sliding down the OR table.
 - The circulating nurse must be vigilant about the position of the feet and concerns of circulatory or nerve impairment.
 - Check position of foot to ensure feet are not being allowed to drift to the side and that they are still being supported by the foot board.

G) Lithotomy

Risks:

- Hip dislocations, fractures, and muscle injuries.
- Injury to peripheral vessels and nerves including, but not limited to:

- Brachial plexus.
- Ulnar nerve.
- Axillary artery and nerve.
- Lateral femoral cutaneous nerve.
- Femoral nerve.
- Common peroneal nerve.
- Sural and plantar nerves.
- Pressure to occiput, shoulders, scapula, hips, heels, sacrum/coccyx, and to lateral aspects of the legs, feet, ankles, knees, and lower legs may increase risk of pressure sores.
- Back strain.
- Decreased lung capacity.
- Venous pooling shifts toward head.
- Deep Vein Thrombosis (DVT) to lower extremities.
- Crushed fingers.

Positioning devices/resources may include:

- Small pillow or gel head rest.
- Self-locking arm board(s) (as applicable).
- Gel roll.
- Securing devices for arm boards or for tucking arms at sides (as applicable).
- Stirrups-Boot-type: supports the foot and calf, distributes pressure evenly, and limits abduction.
- Padding as appropriate to the length of the procedure.

Positioning the patient:

- In some situations, it may be beneficial to position patient in the lithotomy position prior to anesthesia. (**Rationale:** allows assessment of painful areas and limits to range of motion (ROM). Allows the patient to create a position that is comfortable yet appropriate for surgery. Allow the patient to assist with positioning (e.g. assist in lifting limbs to position in stirrups). Reduce the risk of injury to HCW associated with lifting of limbs.)
- Maintain the patient in lithotomy for the shortest duration possible.
- Follow supine guidelines for upper body.
- Lower bed to the lowest height possible for the procedure.
- Following Safe Patient Handling Guidelines under 2.4., position the anesthetized patient on the bed with the buttocks even with the perineal cutout. Do not allow buttock to overhang into cutout. (**Rationale:** supports the lumbar-sacral spine, prevents muscle strain.)
- Place gel roll under patient's sacrum for additional support or to slightly elevate buttock (as required) dependent on the surgical procedure.
- If arms are tucked at sides, ensure fingers are free and clear from bed joints when lowering or raising bed platform.

- Placing legs in stirrups:
 - Stirrups shall be of the same type: securely fasten at the same level (equal height).
 - Securely fasten stirrups at same level along the side of the OR bed and adjust both stirrups to equal height.
 - Extreme heights of stirrups should be avoided.
 - With two (2) HCWs, simultaneously place the patient's legs in the appropriate stirrups as follows:
 - Approach from the side of the patient.
 - Use proper body mechanics.
 - Slowly bend the patient's knee and hip supporting legs at the sole of the foot and at the calf near the knee.
 - Lift the foot and place in the stirrup.
- Limit hip flexion (< 90 degrees). Pay particular attention to patients who have limited ROM (i.e. hip prosthesis), amputations, casts, existing back pain, spasticity, or who are obese.
- Minimize rotation of hip joint therefore causing excessive abduction. (**Rationale:** prevents sciatic and obturator nerve injury and joint and muscle strain.)
 - Apply padding to any part of the leg or foot that comes in contact with the metal post.
- Avoid candy cane stirrups.

Using Boot Type (Universal, Yellow Fin) Stirrups:

- Follow manufacturer's recommendations for use.
- Attach stirrup support to bed at level of the patient's hip.
- Position the boot to ensure that patient's foot aligns with the right knee and left shoulder.
- Seat heels appropriately in the cushioned boots.
- Check that the peroneal nerve and posterior knee are clear of pressure from the boot.
- Remove foot and leg sections of mattress pad from OR bed and lower platform fully.
- Remind scrub personnel not to lean on patient's thighs or legs. (**Rationale:** leaning increases pressure areas.)
- Evaluate distal extremity pulses pre, intra, and post-op (recommended).

Post procedure:

- Raise the lower platform being cautious to not catch patient's fingers in the bed joint. Return and secure OR bed mattress pad portions.
- Using two (2) HCW simultaneously remove patient's legs from the stirrups as follows:
 - Support the each leg at the sole of the foot and at the calf near the knee.
 - Slowly lower the patient's feet and straighten the knees.
 - While supporting the knee joint and foot, bring the knees together and slowly lower the legs. (**Rationale:** allows for slow revascularization of the

lower limbs; therefore decreasing possibility of hypotension. Also assists to avoid triggering spasticity in the susceptible patient.)

7. Lateral

Anesthetize and intubate patient in the supine position.

Right lateral = right side is down (dependent), left side is up

Left lateral = left side is down (dependent), right side is up

Risks:

- Tilting and falling during the procedure.
- Pressure to structures on patient's dependent side (i.e. eye, side of face/ear, shoulder, axilla, elbow, hip, knee, ankle, feet).
- Venous pooling shifts toward patient's dependent side.
- Decreased lung capacity of dependent lung.
- Injury to peripheral vessels and nerves including, but not limited to:
 - Brachial plexus.
 - Ulnar nerve.
 - Axillary artery and nerve.
 - Common peroneal nerve.
- Deep Vein Thrombosis (DVT) to lower extremities.
- Positioning devices/resources may include:
 - Small pillow or gel donut head rest.
 - Self-locking arm board.
 - Axillary roll.
 - Securing devices for arm board.
 - Arm board attachment (elbow post, Krause armrest, Western elbow positioner, or over arm board as per surgeon preference).
 - Lateral positioners such as lateral body rests, vacuum positioning device ("beanbag") or gel bolsters (as applicable) for patients over 115 lbs. (52.2 kg).
 - Safety strap.
 - Wide adhesive tape.
 - Pillows.
 - Padding as appropriate to the length of the procedure.

Positioning the patient

- If using vacuum positioning (Bean bag) device:
 - Place on OR bed, prior to patient transfer to OR bed.
 - Place patient directly on device or as per manufacturer's directions.
 - Remove air **after** raising kidney rest and flexion of the OR table.
- Turn the patient from supine to lateral position following Safe Patient Handling Guidelines under 2.4.

- Maintain patient in lateral position with padded lateral body rests/gel bolsters/vacuum positioning device as applicable. Follow manufacturer's direction and/or surgeon preference when using these devices.
- Kidney Rest:
 - Position patient with lower iliac crest slightly below the lumbar break in the OR bed;
 - Raise the kidney rest.
 - Flex the bed to elevate the area between the 12th rib and iliac crest (head and legs are lowered) for optimal kidney access.
- Axilla/Arms: Place axilla roll inferior and posterior to the axilla, under the rib cage. Verify the patient's bilateral radial pulses after placement of the axillary support. (**Rationale:** Protects axillary artery, axillary nerve, brachial plexus, and takes the weight off of the deltoid muscle of the dependent shoulder/arm.)
- Dependent arm:
 - Place with palm up.
 - Extended arm less than 90 degrees.
 - Secure arm to padded arm board.
- Upper arm:
 - Place on appropriate arm board attachment or rest on pillows placed between the arms.
 - Flex arm slightly with palm facing down.
 - Do not abduct arm higher than the shoulder.
 - Secure to applicable arm board attachment or pillows.
- Shoulders may be secured with wide tape if surgeon requires. (**Rationale:** thoracic – draws the scapula away from the operative site, widening the intercostal spaces.)
- Legs: Flex dependent hip and knee for stability.
 - Pad dependent leg at lateral knee, lateral malleolus, and foot.
 - Place pillows x two (2) lengthwise between legs. (**Rationale:** pads and protects the dependent common peroneal nerve, takes pressure off of the upper hip/dependent leg thereby benefiting circulation and assists with pressure management by avoiding bone on bone contact at knees and ankles.)
 - Straighten or slightly flex the non-dependent leg to assist with counterbalance.
 - Place safety straps over the legs and/or hips depending on the surgical procedure.
- Other Considerations:
 - Ensure dependent ear is not folded over.
 - Ensure no pressure on dependent eye/orbit.
 - Confirm with anesthesia that airway is patent.
 - Ensure genitalia are not confined.
 - For obese patient ensure abdomen does not exceed the table width. Extend the table width with a bariatric bed attachment as required. (**Rationale:** an

abdomen that extends beyond the table width may potentially unbalance the patient and ultimately pull the patient off of the table.)

8. Prone

NOTE: in all prone procedures a stretcher or hospital bed must be immediately available for the duration of the procedure so that in the event of a cardiac arrest or loss of the airway the patient can be expeditiously turned supine and resuscitated.

Risks:

- Pressure to cheeks, eyes, ears, breasts, genitalia, patellae, and toes that may result in pressure sores.
- Falls and dislodgement of airway, monitoring cords and/or IV lines.
- Decreased lung capacity/respiratory function.
- Injury to breasts and genitalia.
- Injury to shoulders, arms and upper extremity nerves including, but not limited to the brachial plexus and ulnar nerve.

Positioning devices/resources may include:

- Pillows.
- Bolsters.
- Padding as appropriate to the length of the procedure.
- Appropriate head pillow/supports such as the Mizuho Proneview used for TEMs cases.
- Rolls – use action pad rolls or other padding devices dependent on assessed need.

For neurosurgery/spinal surgery cases positioning devices may include:

- Anesthetize patient in the supine position and then log roll into the prone position.
- For head support:
 - A small pillow/gel donut/head rest/head support that attach to the table (i.e. Sugita, Mayfield) as applicable to the procedure may be used.
- Bolsters (as applicable).
- Wilson frame.
- Jackson table.
- Kneeling attachments – table attachment dependent on the procedure being performed.
- Padding as appropriate to the length of the procedure.
- Self-locking arm board(s)/arm supports.

Positioning the patient:

- Follow Safe Patient Handling Guidelines under 2.4.
- Anesthetize patient in the supine position and then log-roll into the prone position.
- The anesthesia care provider controls the patient's head and neck as the patient is turned.

- Pad all bony prominences and areas where the patient's skin comes in direct contact with lines during the procedure using gel pads or jute padding.
- Arms:
 - Place arms on an adequately padded arm board extended no more than 90 degrees from the patient's body, with the arms slightly flexed and palms facing downward. Never position the arms above the patient's head. **(Rationale: prevents brachial plexus injury.)**
 - If position arms at patient's sides place palms facing the body (thighs).
- Breasts, genitalia:
 - Use bolsters from the clavicle to the iliac crest. **(Rationale: allows for adequate chest expansion and decreases pressure to the patient's abdomen.)**
 - Place bolster/pillows under hips to elevate buttock as per surgeon preference.
 - Position breasts and genitalia in such a way that they are free from pressure and torsion injury during the intraoperative phase.
- Knees – use gels/pillows underneath as required.
- Feet are supported so the toes hang freely.
- Place safety strap across the posterior upper thigh 2 inches above the knees.
- For the obese patient, allow abdominal wall to hang freely. **(Rationale: decreases diaphragm impedance and allows chest wall movement.)**

9. Special Considerations

A) Pregnant Patient

- When supine, place a roll under the patient's right side. **(Rationale: Displaces pressure off of the vena cava.)**

B) Obese Patient:

Obese Patient (refers to patients with a BMI of > 30), Severely Obese Patient (refers to patients with a BMI of >40), and Bariatric Patient (refers to patients who are overweight by more than 100-200 lbs or have a body weight greater than 300 lbs).

- Weight measurement should be within the last 14 days if possible.
- Ensure that the OR bed and mattress has the appropriate weight capacity to accommodate the patient and positioning requirements/configurations (i.e. Trendelenburg, tilt, reverse). Add appropriate extensions to the OR bed if required.
- Consider an additional safety strap over the patient's lower legs to secure position.
- Use positioning devices specifically designed for use with patients who are obese/bariatric (i.e. bariatric stirrups).
- Side bed attachments may be used for patients with extra-wide girth.
- When supine place a roll under the right side. **(Rationale: Displaces pressure off of the vena cava.)**

- Consider a wedge pillow under upper thorax. (**Rationale:** Increases chest wall compliance with ventilation.)
- Positioning for intubation is of primary importance for the bariatric patient. The Head Elevated Laryngoscopy Position (HELP) may be required. The patient's head and upper body may be positioned using folded blankets/flannels or a customized troop elevation pillow.

Refer to the WRHA Regional Bariatric Care Plan for guidelines to provide safe, efficient and effective care for bariatric clients found at:

http://home.wrha.mb.ca/prog/clinicalinitiatives/bariatric/files/Bariatric_CarePlan.pdf

C) Neuro, Cranial and Spinal Surgery

There are 5 classic surgical approaches for craniotomies: frontal, temporal, occipital, parietal, and posterior fossa.

Risks:

- Quadriplegia, cerebral infarction, and possible mechanical stress of arteries and veins supplying the brain and cervical spine related to manipulation of the head and neck during positioning.
- Decrease blood flow in vertebral and carotid arteries, leading to brain stem ischemia, resulting in quadriparesis and quadriplegia as a result of hyperflexion of the head and neck.
- Associated with lateral position:
 - Brachial plexus or shoulder injury therefore gel axilla roll used.
- Associated with supine:
 - Compression injury of tucked arm.
- Associated with sitting position (*rarely used*):
 - High incidence of air embolism (25% - 40%) related to air entrapment due to the negative pressure gradient between the surgical site and the heart.
 - Hypotension if the position is not attained gradually and not preceded by adequate hydration.
 - Cardiac output decrease related to a reduction in venous return.
 - Airway obstruction related to over flexion resulting in supraglottic edema, obstruction of the endotracheal tube.
 - Brachial plexus stretch injuries related to inadequate arm support.
- Associated with beach chair position (30 to 60 degrees with head up) (*extremely rare*):
 - Hypotension and/or bradycardia.
 - Decreased cerebral perfusion pressure.
- Associated with prone position:
 - Central retinal artery occlusion from direct or indirect pressure on the globe.
 - Periorbital and scleral edema with time in prone position related to progressive intraocular pressure increases.
 - Eye trauma.
 - Compression injury.

Positioning devices/resources required:

NOTE: Cutaneous pressure point protection needed for all positions.

- Specialty headrests and fixation devices which attach to the OR bed (may be secured to the patient's head with the use of pins which are inserted into the patient's skull and completely immobilize the patient's head).
 - Mayfield or Sugita skull clamp, or Leksell frame, Mayfield gel Horseshoe Headrest.
 - Secured to the OR bed with the use of an articulating attachment such as the Mayfield bed attachment or a coupling device such as the Jackson coupler to allow for fine adjustments.
 - Mayfield gel Horseshoe headrest is an alternative to the skull clamps where appropriate – usually used on supine patients.
- **NOTE:** Craniotomies in the prone position are ALWAYS in pins.
 - Risks – compression of the ear.
- The surgeon places the skull clamps on the patient's head (except for the awake patient) after anesthesia is administered.
 - The skull clamp is placed on the skull to provide access to the surgical site and to avoid:
 - Frontal sinuses.
 - Superficial temporal arteries.
 - Eyes.
- Local infiltration of the skin is often used in awake or anesthetized patients for application of skeletal fixation device. (**Rationale:** to decrease risk of raised intracranial pressure (ICP), application of the device and tightening of the pins on the scalp has profound stimulating effect, leading to tachycardia and hypertension.)
- Specialized spinal OR table with attachments (including specialty headrests and fixation devices), which allows for customized positions and radio-translucent access for C-arm fluoroscopy.
 - The OSI lateral position table.
 - The Jackson spinal table.

Procedures Requiring both Anterior and Posterior Approaches:

NOTE: When using a specialized OR spine table with attachments (including specialty headrests and fixation devices, bolsters and frames), such as the Jackson Spine Table, please review facility specific guidelines.

- The patient is positioned in supine position for part of the surgery and is rotated to a prone position for the second phase of the surgery (or from prone to supine).
- During positioning, the head can typically be safely rotated between 0-45 degrees away from the midline/neutral position.
- Good venous drainage and maintaining a low intracranial pressure (ICP) are important considerations.
- Positioning is surgeon led.

- When assisting the surgeon during patient positioning, care is taken to prevent injury to the spine, shoulder or head.
- Ensure the head is securely supported and in anatomical position at all times to prevent hyperextension of the neck or sudden movement.
- The surgeon supports the patient's head during the position change and adjusts the final head position after the patient is placed prone.
- After positional adjustments are made to the patient's body, the skull clamp (if used) is locked into the articulating arm/coupler by someone other than the person holding the head.
- If using a skull clamp and articulating arm, they are tightened from distal to proximal and are double-checked for security. No positional adjustments can be made to the patient's body without first releasing the head. Not doing so could cause injury to the patient's cervical spine. To release the skull clamp, the arm is loosened from distal to proximal, while the head is supported by another individual.
- Two individuals (together) verify that all locking devices are secure and in their locked position.
 - Verify each device in a systematic sweep from patient's feet to head.
 - If the patient is to be rotated, do not rotate the patient until all locking knobs have been secured.
- For cervical spine surgery both arms are tucked at the patient's side.
- For lumbar procedures arms may be placed out on arm boards.
- In the prone position, arms may be flexed above the head on arm boards with palms down. Position the patient's arms and adjust the arm boards as needed.
- Confirm that the patient's arms are positioned so that there is no more than 90 degrees flexion at the shoulder and no more than 90 degrees flexion at the elbow. Use arm straps or padding with tape to secure the arms.
- Sequential compression stockings are often applied to prevent deep vein thrombosis.
- Pads may be placed over the eyes to protect them from injury. This is at the discretion of the anesthesiologist. The anesthesiologist may prefer to not place pads so that they can see the face and eyes better and know that nothing is compressing the globe of the eye.

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Appendix A: Wound Assessment & Management

(Adapted from Manitoba eHealth Learning Management System (LMS): Wound Care Modules 1A-3B)

Wound Assessment:

A) Establish the etiology (cause of the wound)

- Pressure- typically occurs over bony prominence or anywhere where sustained pressure on the skin is not relieved.
- Venous Insufficiency-impaired venous return to the heart and usually occurs on the lower legs and ankles.
 - Causes: IV drug use, deep vein thrombosis (DVT), varicose veins, leg paralysis, obesity, trauma
 - Characteristics:
 - Located in pre-tibial area
 - Irregular borders
 - Large amount of edema/exudate
 - Peri wound skin can have dermatitis/maceration
 - Arterial Compromise- occurs due to tissue ischemia (from decreased blood flow) and usually occurs on the lower legs and toes.
 - Causes: atherosclerosis, smoking, trauma, obesity,
 - Characteristics include:
 - 'punched out' appearance/well defined border
 - little edema/exudate
 - slough/eschar in the wound bed
 - little/pale granulation
 - skin may be pale, shiny, taut
 - no hair on legs/feet

- pedal pulses not usually palpable
- Neuropathic/Diabetic- caused by peripheral neuropathy, diabetes, structural foot changes, trauma/pressure, and is usually on the plantar surface of the foot.
 - Characteristics:
 - Loss of sensation
 - Dry skin, results in fissures/cracking
 - Foot deformities (hammer toes, claw foot)
- Surgical Dehiscence
- Trauma (skin tear)- separation of skin layers caused by shear, friction, and/or blunt force (associated with aging, immature skin of premature infants, chronically/critically ill individuals)
- Other causes/contributing factors include medications (e.g. immunosuppressant drugs, corticosteroids, chemotherapy, anticoagulants).

B) Establish the wound characteristics

- Wound pain- assess for type, cause, duration, location
- Wound size- measure in centimeters (cm), record as length x width x height.
- Wound bed may be:
 - Necrotic eschar- dry, black, brown dead tissue
 - Slough- dry or wet, loose or firmly attached, yellow/brown dead tissue
 - Granular- firm, red, moist, pebbled tissue
 - Superficial pink /red tissue- clean pink/red tissue with non measurable depth
 - Hypergranular-raised above the level of the skin
 - Non granular- moist red (pale to bright) non pebbled tissue
 - Friable- unhealthy fragile red/pink tissue that bleeds easily
 - Any underlying structures (i.e. bone, tendon, mesh) should also be identified
- Wound exudate- note amount (none, scant, moderate, heavy) and type of drainage:
 - Serous
 - Sanguineous
 - Serous/sanguineous
 - Purulent
- Wound edge may be:
 - Diffuse- poorly defined; difficult to identify the outline
 - Epithelialized- pink to purple, shiny new epithelial tissue
 - Undermined- destruction of tissue underneath the wound
 - Rolled- edge of the epithelial cells starts to roll inward and under
 - Demarcated- edge is well defined, easy to identify the outline of the wound
 - Callused- thickening of the epidermis around the open wound
- Wound odor- unpleasant smell after cleaning; may be due to infection, necrotic tissue.
- Periwound skin – skin around the wound. May be:
 - Intact- most desirable
 - Macerated- too much moisture in contact with surrounding tissue, causing it to appear white in color
 - Erythema- redness of surrounding skin

- Induration- abnormally firm and palpable

Wound Management:

- Avoid applying antiseptic solutions
- Select dressings that do not adhere
- Protect wound margins
- Remove dressings gently
- Eliminate pressure/shear/friction
- Gentle handling at all times
- Local wound care/treatment consists of:
 - Gently cleanse with sterile water or normal saline
 - Pour over the wound (100-150 mL)
 - Soak/compress with moist gauze
 - Cytotoxic agents (e.g. hydrogen peroxide is highly toxic to tissues and is not recommended)
 - For skin tears:
 - Cleanse and approximate skin edges with sterile forcep or cotton applicator (viable for 7 hours)
 - Use non adherent dressing for moisture balance
 - If bleeding, apply pressure, use alginate as primary dressing, gauze, cover with gauze/wrap
 - Do not use tape
 - Use barrier film/wipe during dressing removal
 - Dressing should be dated, and show direction of direction of dressing removal by drawing an arrow on it.
 - For arterial ulcers:
 - Do not debride
 - Keep dry gangrene dry
 - Paint with iodine, if antiseptic is used
 - Dressing applied should:
 - Provide moisture for the wound
 - Prevent infection/pain
 - Prevent damage to the wound/peri wound
 - Provide thermal insulation
 - Antimicrobial dressing is recommended for local infection, if patient has 3 or more signs present:
 - Non healing wound
 - Exudative wound
 - Red bleeding surface, friable granulation tissue
 - Debris such as eschar or slough
 - Smell or unpleasant odor from wound
- Document assessment and wound care performed:
 - measurements (length, width, depth)

- exudate (quantity, quality)
- appearance (wound bed, tissue type & amount)
- suffering (pain level, type)
- undermining (presence/absence)
- edge (condition of edge, surrounding skin)
- consider debridement (consult plastic surgeon, wound care clinician, etc.) if wound is necrotic (firm eschar, soft slough) and is determined healable
- type of dressing(s) applied.