Post Anesthetic Patient in Phase 1, Care of

Site Applicability

VGH & UBCH PACU

Practice Level

RN: Advanced Skill

Policy Statements

1. All patients admitted to PACU will have airway patency, respirations, SpO2, pulse, blood pressure, depth of consciousness, sedation score, pain level, muscle tone and temperature assessed as per the TABLE: Assessment Parameters and Frequency below. Other parameters (e.g., surgical, neurological, hemodynamic, and ventilator) will be assessed and monitored as applicable to the individual patient as per the TABLE below.
2. RNs are responsible for monitoring and documenting assessment parameters at intervals specified in the TABLE below and for increasing the frequency and scope of assessments as required by changes in the patient's condition.
3. Monitor alarms remain ON for the entire duration of the patient's stay in PACU whether or not discharge criteria have been met – **NO EXCEPTIONS.**

Protocol

Table: Assessment Parameters & Frequency

VS/PARAMETER	FREQUENCY: VGH PACU/PCC	FREQUENCY: UBCH PACU
Airway Patency	**On admission and:** • Q5 minutes if unconscious/reacting or actively treating an unstable parameter • Q15 minutes if responding/conscious and stable **I-PACU** • Q15 minutes for minimum 2 hour & stable, then • Q30 minutes x 2 hours & if stable, then • Q1H until discharged	**On admission and:** • Q5 minutes if unconscious, unstable, somnolent or activity treating an unstable parameter • Q15 minutes if conscious and stable **Patients who have met discharge criteria and are awaiting transfer to SDC:** • Q30 minutes x 2 & if stable, then • Q1H until transferred
Respirations		
SpO2– • Monitor continuously **ETCO2–** (as applicable) • Monitor continuously		
Pulse / Heart Rate		
Blood Pressure		

• do not use arm on same side as node dissection, AV shunt/fistula, arm where surgery performed • see **Hemodynamic Parameters** for invasive BP monitoring	**Patients who have met discharge criteria & are awaiting transfer to nursing unit or assignment to a hospital bed:** • continuous SpO2 monitoring • Q1H x 2 hours & if stable, then • Q4H x 24 hours or as directed by surgical orders	**Long-stay/stable patient who has not met discharge criteria:** • Q15 minutes for minimum 1 hour & if stable, then • Q30 minutes x 2 hours, then • Q1H until discharged **Patients who have met discharge criteria & are awaiting transfer to nursing unit:** • Q1H x 2 hours & stable, then • Q4H x 24 hours, then • As per Vital Signs and Observation, Post-Operative Monitoring (archived).
Depth of Consciousness		
Sedation Score: **VGH PACU: use POS** • Begin when patient is conscious **UBCH: use LOC/Sedation Score** **Pain Score** • Begin when patient is conscious • Use VAS 0-10 or equivalent		

VS/Parameter	FREQUENCY: VGH PACU/PCC & UBCH PACU
Sleep Apnea Protocol	**Patients who have met discharge criteria & are remaining in PACU due to OSA Protocol, i.e. 1 hour extended stay:** • Continuous SpO2 & ECG monitoring • Respiratory parameters, BP & HR Q1 hour until discharged • **EXCEPTION** – Monitor & document respiratory parameters (baseline and lowest SpO2, respiratory rate, regularity, apneic episodes, airway patency), BP & HR Q15 min during **room air challenge** as applicable
Muscle Tone	Document if abnormal.
Temperature	• Within 30 minutes of admission, then • Q1H until discharge & within 30 minutes of discharge • Q30 minutes when actively warming the patient • Prior to initiating a blood transfusion • 10 to 15 minutes after initiating the transfusion • Q1H during transfusion
Sensory & Motor Level –	**Neuraxial anaesthsia: Sensory dermatome & motor level** • Q15 to 30 minutes until discharge criteria met, then

• Ice used to evaluate sensory level	• Q1H or as per medical orders **Peripheral Blocks: Distribution of sensory/motor impairment and complications appropriate to type of block (See Appendix B)** • Q15-30 minutes until discharge criteria met, then • Q1H or as per medical orders
Bladder • for distention/overflow via bladder scan, palpation or observation of clinical indicators	• within 30 to 60 minutes of discharge and/or as warranted by clinical indicators of urinary retention • refer to "Guidelines for Bladder Scanning in PACU" for patient populations requiring mandatory bladder scanning
SURGICAL PARAMETERS **General:** • dressings • visible drains/incisions • surgical site • IV/IV site(s)	• Q15 minutes for minimum 1 hour & until stable, then • Q30 minutes x 2 hour, then • Q1H until discharge
Neurovascular (CSMW): • **Orthopaedic Surgery** • **Vascular Surgery** • **Any Surgery with Potential for Peripheral Nerve or Circulatory Injury** ✓ CSMW to all operative limbs ✓ Graft/Fistulae: ○ Bruit/thrill ○ Pulse	**On admission & then if WNL** (Within Normal Limits) for the patient **or expected due to regional or neuroaxial block:** • Q30 minutes x 1 hour & stable, then • Q1H x 4 hours, then • Q4H if stable **NOT WNL:** (i.e. due to possible surgery-related cause) • Q15 minutes until WNL & stable, then • Q30 minutes x 1 hour, then • Q1H x 4 hours, then • Q4H if stable **NOTE: For 1st (admission) assessment, assess both operative & non-operative extremity**
Microvascular • **Reconstructive Flaps**	**On admission and** • Q15 minutes until WNL & stable, then • Q30 minutes x 1 hour, then • Q1H until discharged

VS/PARAMETER	VGH PACU	UBCH PACU

Spinal Cord Assessment **All Spine Related Interventions including:** • Vertebral column surgery • Spine surgery (e.g., tumor removal) • Radiology procedures, e.g. vertebroplasties, embolizations • actual or high risk for spinal cord injury ✓ **Cord segments**	**On admission complete motor assessment for all segments at and below surgical level or injury then** • 1 hour after admission assessment, then • Q4H if stable & within 30 minutes of discharge and • After turning/repositioning (level ✓)	• Not Applicable
Neurological • NVS	**On admission then** • Q15 minutes for minimum 1 hour & until stable, then • Q30 minutes x 2 hours, then • Q1H until discharged	• Not Applicable
• ICP	**On admission then** • Q1H (or as per medical order)	• Not Applicable
	FREQUENCY: VGH PACU & UBCH PACU	
Cranial Nerves	**On admission then** **WNL:** • Q30 minutes x 1 hour & stable, then • Q1H x 4 hours, then • Q4H if stable **NOT WNL:** • Q15 minutes until WNL & stable, then • Q30 minutes & stable, then • Q1H x 4 hours, then • Q4H if stable	
Hemodynamic Parameters • **BP via Arterial Line (I-ABP)** **NOTE:** • **waveform appropriate** • **levelled & zeroed**	**I-ABP is preferred method when:** • Actively treating BP • Rapidly fluctuating BP or extremes in BP • Physiologic conditions that render NIBP unreliable, e.g ○ Irregular hear rate ○ Edematous extremity ○ Continuous motion artifact (shivering, restlessness/agitation	

<table>
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- **Dynamic Response confirmed**
- **Over/underdamping factors addressed**
- **Physiological factors optimized**

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- Unable to properly fit BP cuff

Stable Patient and BP WNL and acceptable tissue perfusion:

- Follow I-ABP
- Check NIBP Q1 to 2H

Unstable Patient

- Follow I-ABP
- Check NIBP Q15 minutes until BP stable →
- NIBP Q1 to 2 Hours

Sudden Change in BP

- Validate immediately with NIBP & check NIBP in opposite arm if possible →
- Check NIBP Q15minutes until BP stable →
- NIBP Q1 to 2H

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CVP/RA

✓ Increase frequency when treating RA/CVP

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On admission then

- Q1H for minimum 4 hours & stable, then
- Q2 to 4H at RN's discretion
- Pre- and post- bolus

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<tr><td>**VS/Parameter**</td><td>**VGH PACU**</td><td>**UBCH PACU**</td></tr>
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PAP (S/D/M)

✓ Monitor waveform continuously

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On admission, then

- **Q1H**

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- Not Applicable

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- **Cardiac Output**
- **SVR**
- **PCWP**

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Obtained by Anaesthesiologist:

- If PAD is within 5 mm Hg of obtained PCWP, follow PAD as long as patient is hemodynamically stable

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- Not Applicable

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SVO_2

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On admission, then

- **Q1H**

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- Not Applicable

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<tr><td></td><td colspan="2">**FREQUENCY: VGH PACU & UBCH PACU**</td></tr>
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PAP Therapy (eg. CPAP, BPAP, APAP)

- Mode
- EPAP Level
- IPAP Level
- Supplemental O2 (LPM)

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On admission then

- Q1H & when changed

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• Other parameters specific to mode (e.g. back-up rate, volume target, in/max pressures) **Consult with AA or RT re appropriate settings**	
Ventilator Parametres: • Mode • FiO2 • Rate (set/pt) • Vt (set/pt) • Peak Pressure • Mean pressure • Inspiratory Time • I:E Ratio • Minute Volume (VE) • PEEP/CPAP Level • PS or PC Level	• On admission, then • Q1H & when changed
• Inspiratory Flow/Autoflow	• On admission, then • Q12H & when changed
• Slope/Waveform (as applicable)	• On admission, then • Q12H & when changed
• Trigger	• On admission, then • Q12H & when changed
• ETT Position ✓ cm marking at teeth	• On admission, then • Q2H (following turns/repositioning)
• Cuff Pressure	• On admission, then • Q12H
Drug Infusions • BP/ECG ✓ Refer to Epidural Infusions in PAR for monitoring & assessments related to epidural infusions/injections.	**Vasoactives/Inotropes:** • Monitored continuously • Q5 minutes when titrating up or down • Q15 minutes until 1 hour & stable, then • Q1H if no change in infusion dose • Q15 minutes for minimum 1 hour after infusion discontinued & stable **Antidysrhythmics:** • Monitored continuously • Q15 minutes for minimum 1 hour & stable, then • Q1H

Practice Guideline

Assessment

On admission to PACU:

1. Assess for symptoms of upper and/or lower airway obstruction by tracheal & lung auscultation and observation:
    - Absent or decreased breath sounds
    - Adventitious sounds, e.g., gurgling, snoring, stridor, wheezing, crackles
    - Dyspnea, e.g. nasal flaring, tracheal tug, indrawing, restlessness, increased abdominal movement
    - Persistent coughing or gagging

IMMEDIATELY INTERVENE IF AIRWAY OBSTRUCTION IS PRESENT!!!

2. Assess for presence, site, position and patency of artificial airways.
3. Assess baseline respiratory status including:
    - Rate, depth, ease & regularity of respirations
    - Symmetry of chest expansion
    - System & amount of supplemental oxygen
    - Peripheral & central skin colour
    - Arterial oxygen saturation
4. Initiate ECG monitoring and assess rate, rhythm and for evidence of ischaemia as applicable.
    - see ECG Monitoring in PAR [D-00-12-30305].
5. Assess blood pressure, avoiding arm with AV fistula in situ, operative arm or arm on same side as mastectomy with axillary lymph node resection.

6. Assess other circulatory parameters as applicable to the patient, e.g., CVP, peripheral perfusion.
7. Assess depth of consciousness and sedation.

VGH PACU/PCC	UBCH PACU/SDC
Assess depth of consciousness: • **UNCONSCIOUS** – no response to stimulation • **REACTING** – non-purposeful movement to stimulation • **RESPONDING** – obeys simple commands, not oriented • **CONSCIOUS** – oriented to person, place & time	**To assess Level of Consciousness/Sedation:** • A score key is used which combines level of consciousness with sedation (See Appendix A-2) • 2 = Conscious, opens eyes, easy to arouse • 1 = Frequently drowsy, easy to arouse • 0 = Unresponsive or somnolent
Assess Sedation Score when patient is **conscious using Passero Opioid Induced Sedation Score - POSS** (See Appendix A-1)	

8. Assess muscle tone, e.g., ability to sustain head lift, extremity strength & movement.
9. Assess temperature:
    - Temporal artery temperature (TAT) using temporal artery thermometer or oral temperature with IVAC thermometer if temporal site inaccessible
10. Assess motor & sensory level of regional anesthesia:
    - Spinal/epidural sensory dermatome levels will be determined by testing with ICE, starting from the lower or blocked area. The dermatome documented is the first area where the patient feels a cold sensation.
    - Verify the patient's ability to independently turn side to side for airway protection prior to discharge.
11. Assess nerve-specific motor/sensory function as applicable for upper and lower extremity peripheral nerve blocks (See Appendix B)
12. Assess surgical parameters including:
    - IV site, catheter, solution, amount & rate
    - Site & condition of dressings, incision lines
    - Site of & returns from drains & catheters in situ
    - Surgery specific parameters, e.g., neurovascular status, NVS, ostomy condition, traction, etc
13. Assess for risks to comfort & safety:
    - Pain level
    - Sedation score
    - Positioning/body alignment
    - Disorientation/agitation
    - Skin integrity

- Lumbar puncture/epidural/PNB site (as applicable)
- Nausea & vomiting
- Shivering
- Bladder distention
- Presence or use of **restraints**
  - CSMW & skin integrity of restrained limbs Q1H
  - resolution or escalation of behaviours requiring restraint application Q15 minutes

14. Calf compressors

  - appropriate fit/application/settings
  - patient comfort, evidence of motor, sensory or circulatory abnormality

15. Assess information obtained from Anaesthesiologist, OR team and patient record regarding:
    - Comorbidities and other conditions impacting care requirements, e.g. substance abuse, aggressive behaviour and infectious disease precautions
    - Language barrier and other special needs that may require family assistance
    - Pre-operative baseline
    - Pre-operative medications with special attention to medications that may be resumed in PACU i.e. cardiovascular, anti-Parkinson's, anti-glaucoma and anti-epileptic drugs.
    - Intra-operative course including anaesthetic drugs, reversal agents and surgeon's notes
    - Fluid balance
    - Pertinent details of surgical procedure, e.g. incisions, drains in situ, implants, prosthetics
    - Anaesthesia orders including goal hemodynamic parameters
    - Surgical orders
16. Confirm with OR RN
    - Patient identification by verifying name, date of birth and MRN with patient ID band & face sheet
      - If ID band Not in situ, OR RN must provide new one
    - Allergy band in situ & information accurate (as applicable)
17. Assess readiness for discharge using discharge criteria.

Interventions

1. **Notify anaesthesiologist if:**

- Persistent airway obstruction not responsive to nursing intervention (e.g. jaw thrust, Stir-Up)
- Dyspnea
- Significant desaturation (SpO2 is < 90%) or hypoventilation
- Significant arrhythmias
- Systolic BP is 20% above or below preop baseline and/or patient is symptomatic, e.g., symptoms of ischaemia, alterations in LOC Symptoms of local anaesthetic toxicity, e.g., confusion, agitation, tinnitus are present
- Cephalad progression of motor/sensory level
- Uncontrolled nausea/vomiting or pain
- Unexpected hypothermia or hyperthermia
- Abnormal lab results

2. **Notify surgeon** if surgical parameters deteriorate
3. **Ensure airway patency:**
   - Position for airway protection
     - flat and on side (unless contraindicated by surgical procedure) if evidence of obstruction in supine position on side if experiencing nausea or vomiting
   - Ensure anterior mandibular displacement via chin lift/head tilt or jaw thrust as required
   - Insert oral or nasal airway prn
   - Suction prn
   - Assist patient to deep breathe and cough as required
   - **Ensure appropriate emergency equipment is at the bedside, e.g., wire cutters, back-up tracheostomy supplies, suture removal set**
4. Initiate and maintain oxygen therapy as per anaesthesia orders.
   - Apply oxygen for shivering or Temp < 36.0°C.
5. Minimize heat loss and/or actively **warm patients** if Temperature is < 36.0°C.
   - Discontinue active warming when **T > 36.0°C**
6. **Stir patient up** Q10 to 15 minutes (unless contraindicated by surgery or anaesthetic technique):
   - 2 to 3 deep breaths using sustained maximal inhalation or incentive spirometry device
   - coughing if secretions present
   - flex/extend extremities
   - progressively elevate HOB as tolerated by
   - blood pressure
   - assess for and relieve pain

7. **Turn** patient side to side Q2 hours and prn (unless contraindicated by surgical procedure or VS instability).
8. Implement measures to **manage pain** including analgesics as ordered, postioning, support of operative site, ice packs, etc.
9. Manage **PONV:**
    - position on side until nausea resolved
    - administer antiemetics as ordered
10. **Re-orient** patient to person, place and time at frequent intervals as required
11. Protect insensate limbs (following spinal anaesthesia, nerve block) from injury:
    - Position & support limbs in correct alignment
    - Ensure adequate padding around boney prominences
    - Limit heat or cold application to maximum 15 minutes and check site after removal to verify skin integrity
12. Implement **comfort** and **safety** measures:
    - Skin and mouth care
    - Cover with warmed blankets
    - Remove wet or soiled linen
    - Ensure bed linen free of wrinkles
    - Ensure limbs in good alignment and protected from pressure
    - Ensure side rails up and brakes locked
    - Secure all tubes and catheters
13. Implement anaesthesia and surgical orders
14. Resume administration of key time sensitive (cardiovascular, anti-Parkinson's, anti-glaucoma and anti-epileptic) pre-operative medications in PACU in the following circumstances:
    - The medication has been reordered
    - The patient is stable and can tolerate oral medications
    - The specific condition is not being actively treated with an IV medication (e.g. receiving Labetolol for hypertension)
    - The patient requires an extended stay (> 4 hours) in PACU

UBCH: FAX copy of inpatient orders to Pharmacy between 0800-2100, Monday to Friday

15. Follow PACU discharge procedure to discharge patient when ready.

UBCH:

When a PACU patient requires transfer to another area direct from PACU for a test/procedure, the PACU RN will collaborate with all staff to ensure that the patient receives appropriate care while still allowing the procedure to be completed. The Anaesthesiologist caring for the patient will remain responsible for the patient if discharge critieria have not been met:

1. **When Discharge Criteria Not Met**
   a. **Non-urgent test/procedure**
      - Attempt to delay test/procedure until patient meets PACU discharge criteria
   b. **Urgent or STAT test/procedure (e.g. CT Scan, treatment at BCCA)**
      - PACU RN must accompany the patient to the test/procedure and remain with the patient throughout the test/procedure, providing required nursing care. The PACU RN will return to PACU with the patient following the test/procedure and will continue to care for the patient until PACU Discharge Criteria are met.
2. **Discharge Criteria Met & Patient going Directly to Test/Procedural Area**
   a. If the patient is going direct from PACU to the test/procedure area and will require nursing care during the test/procedure, the PACU RN will communicate with the ward to determine who will accompany and care for the patient. If the ward is unable to provide an RN, the PACU RN will accompany the patient.

Patient Education

Implement patient education as required in the following areas:

- Purpose of oxygen therapy
- **Regional Anaesthesia:**
  - Return of motor function before sensation
  - **Experiences associated with return of sensory function, e.g., "tingling", buzzing", temperature changes**
  - Estimated duration of block
  - Activity restrictions (e.g., minimum one person to assist with ambulation or use of appropriate ambulation aid following femoral nerve block, avoid prolonged heat/cold application, maintain alignment, protected limb positioning)
- Rationale for stir-up
- Interventions to manage problems/complications
- Anticipated discharge time
- Post-discharge care

Evaluation (Guideline Only)

Patient meets the Discharge Criteria.

Documentation

Document initial and ongoing assessments & interventions including VS, LOC, sensory/motor level, surgical parameters, medications given, complications/problems experienced and patient outcomes as follows.

- If restraints are initiated or in situ, document behaviour(s) requiring restraint application, type of restraint used, time of application & removal and first name/last initial of person applying and/or removing restraints.

Related Documents

- Discharge of the Post Anesthetic Patient - Phase I
- Discharge of Ambulatory Surgical Patients - Phase II
- ECG Monitoring In PAR
- Care of the Patient with Obstructive Sleep Apnea in PACU
- Post Anaesthetic Care Record Guidelines (VGH)
- Preop & PACU Post Anaesthetic Care Record, Inpatient & Outpatient – Guidelines for Use (UBCH)
- Guidelines for Bladder Scanning in PACU

References

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- Odom-Forren J, Ed. (2013) Drains Perianesthesia Nursing: A Critical Care Approach (6th ed). Elsevier, St. Louis, Mo.

- Pasero C. (2013) The perianesthesia nurse's role in the prevention of opioid-related sentinel events. Journal of Perianesthesia Nursing. 28(1): 31-7

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Alternate Search Terms

Post Anesthesia Recovery

Postop

Postop Care

PAR

PACU

SDC

Phase I

discharge criteria

Appendix A-1

VGH Sedation Score

VGH PACU SEDATION SCORE (Derived from PASERO Opioid-Induced Sedation Scale – POSS)	
SCORE	**DEFINITION**
S	Sleep, easy to rouse
1	Awake and alert
2	Slightly drowsy, easily roused
3	Frequently drowsy but rousable, drifts off to sleep during conversation
4	Somnolent, minimal or no response to verbal & physical stimulation (use trapezius muscle squeeze for physical stimulation – DO NOT use sternal rub)

Appendix A-2

UBCH Level of Consciousness/Sedation Score
Discharge of Phase 2/3 Ambulatory Surgical Patients SCORE KEY
Note: If "Activity" equal to Preop, or expected due to OR/Anesthesia, the patient may be given full score (e.g. quadriplegia, after knee surgery)

PARAMETER	SCORE	CRITERIA
LEVEL OF CONSCIOUSNESS /SEDATION	2	Conscious, opens eyes, easy to arouse
	1	Frequently drowsy, easy to arouse
	0	Unresponsive or somnolent
CIRCULATION BP & P	2	Within 20% of pre-op
	1	20% to 40% of pre-op
	0	> 40% of pre-op
RESPIRATION	2	Able to deep breathe
	1	Limited breathing (e.g. obstructed, shallow)
	0	Requires airway support
OXYGEN SATURATION	2	= or > 94% on room air
	1	= or > 94% on O2
	0	< 94%
ACTIVITY ***	2	Steady gait
	1	Moves some extremities, not ready to walk, able to turn to side
	0	No gross body movement
PONV	2	Controlled, acceptable to patient or maximal treatment given
	1	Further treatment required
	0	Uncontrolled after treatment
PAIN	2	Controlled, acceptable to patient or maximal treatment given
	1	Further treatment required
	0	Uncontrolled after treatment
BLEEDING	2	Minimal, no evidence of active or unexpected bleeding
	1	Operative site wet, bleeding/hematoma not increasing
	0	Increasing bleeding/hematoma

Appendix B: Assessment and Care following Peripheral Nerve Blocks in PACU

Policy

1. Block parameters as detailed in Tables 1 & 2 will be assessed:
    - On admission then
    - Q 15 to 30 minutes at the discretion of the RN and considering
        - overall stability of VS & surgical parameters
        - pain control
        - expected block duration
    - Q1H when discharge criteria met
2. The Neurovascular Record (VCH.VA.0038 and VCH.VA.0039) will be used to document motor & sensory function of upper & lower extremity blocks.
3. Continuous peripheral nerve blocks will be managed as per CPD P-100: Continuous Peripheral Nerve Block (CPNB): Nursing Management of the Patient.

Need to Know

Peripheral nerve blocks may target a defined nerve or group of nerves (plexus) or a non-specific network of nerves. Nerve blocks may be delivered as a single, "one shot" injection of local anaesthetic to the target area, as a continuous infusion or may be a combination of both.

The majority of blocks for the upper extremity target the brachial plexus at various levels and include interscalene, supraclavicular, infraclavicular and axillary blocks (see Figure 1). Femoral and sciatic nerve blocks are the most common blocks for lower extremity procedures. In order to block the majority of the lower extremity, 2 blocks (femoral & sciatic) must be performed (see Figure 2). The innervations of the obturator, lateral femoral cutaneous, and posterior femoral cutaneous nerves must also be considered.

In some cases, the block may be supplemented with an additional cutaneous nerve block, for example, the brachial plexus nerve block with adjunctive intercosto-brachial nerve block, sciatic nerve block with saphenous nerve block.

Block duration and intensity varies depending on a number of factors, the most important being the local anesthetic agent used. Dose, concentration, volume of the selected local anaesthetic, adjunctive medication such as epinephrine and the type of block used also affect the duration. Consult with the anaesthesiologist regarding expectations for block recovery.

Practice Guideline

Peripheral nerve blocks may target a defined nerve or group of nerves (plexus) or a non-specific network of nerves. Nerve blocks may be delivered as a single, "one shot" injection of local anaesthetic to the target area, as a continuous infusion or may be a combination of both.

Assessments

Assess:

1. **Block parameters:**
   - Expected duration of block
   - Motor and/or sensory distribution of relevant peripheral nerves - see Table 1
     - General & specific complications associated with the block - see Table 2
2. Signs of block wearing off
   - patient will usually feel a tingling sensation in blocked area before full sensory recovery from block
3. Condition of injection site or catheter insertion site
4. Quality of analgesia related to block
5. Circumferential dressings or cast for tightness
6. Alignment and protection of insensate limbs/areas
7. Symptoms of Compartment Syndrome (as applicable – upper or lower extremity surgery)
   - Pain occurring above an adequate block
   - Abnormal peripheral circulatory parameters (pulses, colour, skin temperature)
   - Progressive swelling of affected limb
   - Underlying muscle tense/hard to palpation

Interventions

Assess:

1. Prevent injury to insensate/blocked area
   - Maintain limbs in anatomical alignment – see Figure 4: Limb Protection Guideline
   - Ensure adequate padding around bony prominences
   - Limit application of heat & cold to insensate areas to no more than 15 minutes and evaluate skin integrity prior to and after removal
   - Lower extremity block -
     - assess quad function prior to mobilizing
     - ensure use of appropriate ambulation aids – i.e. walker, crutches, or 2 person assist
     - ensure patient aware re mobilizing precautions until block resolves
2. Initiate pain management before block wears off
   - Especially important for “one shot” technique
3. Manage complications as per Table 2
4. Management of **Local Anaesthetic Systemic Toxicity (LAST)**:

<table>
<tr><td>SYMPTOMS</td><td colspan="2">• Suspect LAST in any patient demonstrating alteration in mental status, neurological symptoms, or CVS instability during or after local anaesthetic administration</td></tr>
<tr><td></td><td>CNS:
➲ Symptoms may be subtle or absent
• Disorientation, agitation → muscle twitching, seizures
• CNS depression (drowsiness → obtundation, coma, apnea)
• Circumoral numbness, tinnitus, metallic taste in mouth dizziness, double vision</td><td>CVS:
➲ May be the 1st or only indication of LAST
• ↑BP & HR, ventricular ectopy initially →
• Hypotension
• Bradycardia, conduction blocks, idioventricular rhythms
• V. tach, V. Fib</td></tr>
<tr><td>IMMEDIATE TREATMENT</td><td colspan="2">1. STOP local anaesthetic
2. Call Code
3. Airway and ventilatory support
• Ventilate with 100% oxygen
4. ACLS as required with following adjustments
• AVOID vasopressin, Ca++ channel blockers, Beta blockers & Lidocaine
• REDUCE epinephrine dose (< 1 mcg/kgm/dose recommended)
5. Seizure Control:
• Midazolam preferred
• AVOID Propofol if CVS instability present</td></tr>
<tr><td>LIPID 20% EMULSION</td><td colspan="2">1. BOLUS 1.5 ml/kgm (@ 100 ml)→
2. INFUSION – 0.25/ml/kgm/minute (@ 500 ml in 30 minutes)
• Can double infusion rate if BP restored but stays low
3. RE-BOLUS Q5 minutes if cardiovascular collapse persists
4. MAINTAIN infusion for minimum 30 minutes after VS stabilized</td></tr>
<tr><td>POST EVENT CARE</td><td colspan="2">1. Monitor closely for minimum 12 hours for any recurring signs of LAST
• CVS depression related to local anesthetics can persist or recur after initial successful treatment
2. Continue any supportive measures required for symptom control and patient comfort.</td></tr>
</table>

Patient Education

Teach patient/family regarding:

1. Typical recovery pattern from block, e.g.
   - expected duration
   - motor before sensation
   - distal before proximal
2. **Precautions** re heat/cold application, ambulation, proper positioning:
   - **Femoral/Sciatic Blocks –** ensure patient is
     - aware re **high risk of falls** until block resolves
     - able to properly use ambulation aids as applicable
   - Upper Extremity Blocks –
     - Instruct patient to support surgical arm with unaffected arm when sling is removed (e.g. for bathing or dressing) in order to avoid injury to surgical site. This is especially important for shoulder surgeries where dislocations can occur.
3. **Pain management** – take prescribed analgesics
   - as soon as any sensory return is noted
   - before going to bed even if blocked area still feels numb
   - round the clock for the first 24 to 48 hours

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Table 1: Peripheral Blocks: Upper Extremity

BLOCK	Expected BLOCK Distribution		MOTOR/SENSORY ASSESSMENT
Brachial Plexus			
Interscalene • Shoulder, clavicle & upper arm surgeries	**Anaesthesia to:** • shoulder, arm, and elbow (via brachial plexus) and • shoulder "cape" via supraclavicular nerve (originates from Cervical Plexus) **Spares** • ulnar nerve • skin of the axilla and the medial aspect of the proximal arm. (intercostal brachial nerve)		• **All upper extremity peripheral nerves** as per Neurovascular Record • expect early motor/sensory function of ulnar nerve
Supraclavicular • Arm from mid-humeral level to hand • "spinal anaesthetic of the arm"	**Anaesthesia to:** • entire sensory, motor, and sympathetic innervation of the upper extremity **Spares** • skin of the axilla and the medial aspect of the proximal arm. (intercostal brachial nerve)		• **All upper extremity peripheral nerves** as per Neurovascular Record
Infraclavicular • Elbow, forearm, wrist & hand surgeries	• Same as supraclavicular but better anaesthesia from elbow down		
Axillary • Elbow, forearm, wrist & hand surgeries • May require supplemental block of musculo-cutaneous nerve	**Anesthesia to** • elbow, forearm, and hand **Spares** • musculocutaneous nerve		• **All upper extremity peripheral nerves** as per Neurovascular Record
Distal Nerve Blocks			
Terminal branches of radial, ulnar and/or median nerve • Hand & digit surgery • Medial and/or lateral cutaneous nerve	• ulnar, median, and/or radial nerve block results in anesthesia of the area of the hand supplied by the nerve(s). • Medial & lateral cutaneous block provides anaesthesia to anterior and lateral surfaces of the forearm		• **Ulnar, radial & medial nerves**

Table 1: Peripheral Blocks: Lower Extremity

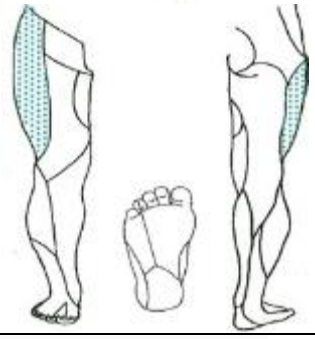
BLOCK	Expected BLOCK Distribution		MOTOR/SENSORY ASSESSMENT
Femoral nerve • In conjunction with Sciatic Nerve block, any surgery from mid-thigh down • As a solo block, surgery on anterior aspect of thigh and superficial surgery of medial lower leg	• anesthesia of the skin and muscles of the **anterior thigh** and most of the femur and anterior knee joint • anesthesia of the skin on the **medial aspect** of the leg below the knee joint (via the **saphenous nerve**)		**All lower extremity nerves as per Neurovascular Record – Lower Extremity**
Sciatic nerve • In conjunction with Femoral Nerve block, any surgery from mid-thigh down • As a solo block, surgery on knee, calf, Achilles tendon, foot & ankle (may require supplemental Saphenous nerve block)	• motor and sensory block to the posterior aspect of the thigh & entire lower leg, **except** medial leg (supplied by the saphenous nerve)		
Femoral cutaneous • In conjunction with Femoral Nerve block, any surgery from mid-thigh down • As a solo block, surgery on knee, calf, Achilles tendon, foot & ankle (may require supplemental Saphenous nerve block)	• anesthesia/analgesia in the anterolateral thigh • sensory coverage variable from person to person		**Analgesic effect only if done as a solo block for pain management**
Saphenous • Sensory block only, usually done to supplement Sciatic Nerve block	• anesthesia of a variable strip of skin on the medial lower leg and foot. • Local anaesthetic may spread from injection site → partial motor block of vastus medialis		• **Sensory assessment medial leg & foot** • **Motor – femoral nerve**
IV Regional Blocks (BIER)			
• **Short** procedures for hand & forearm usually, lower leg less frequently • Injection of local anaesthetic into veins of operative limb • Tourniquet applied to operative limb maintains anesthetic level in operative area & prevents systemic absorption	• Entire extremity below the level of the tourniquet • Patient will experience tourniquet pain after @ 20 minutes • May infiltrate tissues with additional local anaesthetic for post-procedure analgesia • Block resolves shortly after tourniquet released • Be aware of signs of LAST after tourniquet released, particularly with short procedures		

Table 1: Peripheral Blocks: Trunk & Abdominal Wall

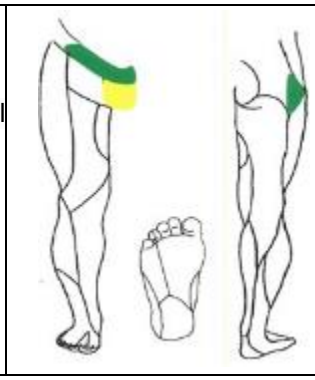
BLOCK	Expected BLOCK Distribution	MOTOR/SENSORY ASSESSMENT
TAP - Transversus Abdominis Plane) • postoperative analgesia for a wide variety of lower abdominal procedures • does not provide analgesia for abdominal viscera • local anaesthetic deposited in the plane between the internal oblique and transversus abdominis muscles	• Ipsilateral abdominal skin, muscles and parietal peritoneum (@ T10 to L1 dermatomes but can be up to T6 depending on volume of anaesthetic deposited • Does not block visceral component of pain	• **Analgesic effect**
Paravertebral • pain management after thoracic surgery, rib fractures • breast surgery	• ipsilateral somatic and sympathetic nerve block in multiple contiguous thoracic dermatomes • dermatome distribution of anesthesia or analgesia is a function of the level blocked and the volume of local anesthetic	• **ipsilateral sensory dermatomes using ice** • **note upper & lower boundaries**
Rectus sheath • postoperative analgesia • does not provide analgesia for abdominal viscera	• periumbilical area	• **Analgesic effect**
Ilioinguinal - Iliohypogastric • inguinal hernia repair & other inguinal surgery	• primarily the lower abdomen, inguinal area, and upper medial thigh although lots of individual variation • local anesthetic may spread via fascial planes to partially block femoral nerve 	• **Analgesic effect** • **Femoral Nerve**

Table 2A: Side Effects & Complications: All Blocks

COMPLICATION	SYMPTOMS	MANAGEMENT
Local Anaesthetic Systemic Toxicity (LAST) • Most likely to occur with continuous infusion but may occur with single shot technique at time of injection • Higher risk with combination blocks	***Suspect LAST in any patient demonstrating alteration in mental status, neurological symptoms, or CVS instability during or after receiving a local anaesthetic ➲ CNS symptoms may be subtle or absent ➲ CVS symptoms may be the 1st or only indication of LAST **CNS:** • Circumoral numbness, tinnitus, metallic taste in mouth dizziness, double vision • Disorientation, agitation → muscle twitching, seizures • CNS depression (drowsiness → obtundation, coma, apnea) **CVS:** • ↑BP & HR, ventricular ectopy initially → • Hypotension • Bradycardia, conduction blocks, idioventricular rhythms • V. tach, V. Fib	• Notify anaesthesia • **STOP** local anaesthetic infusion • Initiate **LAST** Protocol (see Interventions)
Expanding/abnormal block • May be due to misplacement of CPNB catheter, nerve injury, hematoma, surgical injury, Compartment Syndrome or excessive LA , e.g. CPNB	• motor or sensory deficit outside of expected block distribution and/or • motor sensory deficit persists beyond expected LA duration	• Notify anaesthesiologist • Stop LA infusion (as applicable) • Remove or loosen circumferential dressings. If fully circumferential cast, notify surgeon to re-evaluate
Hematoma • vessel injury during needle insertion • coagulopathy	• palpable and/or expanding hematoma at injection site or catheter insertion site • may be associated with unexpected or prolonged motor/sensory deficit	• Notify anaesthesiologist • Pressure to site if appropriate
Nerve Injury • chemical neuropathy or direct nerve trauma during injection (rare) • more commonly, nerve compression (hematoma, improper positioning, tight dressings/casts, etc	• unexpected or prolonged motor/sensory deficit and/or pain in distribution of affected nerve	• Notify anaesthesiologist • Ensure correct positioning, remove or loosen circumferential dressings. If fully circumferential cast, notify surgeon to re-evaluate

Table 2B: Side Effects & Complications: Specific Blocks

BLOCK	SIDE EFFECT/COMPLICATION	ASSESSMENTS & CARE
Interscalene	**Phrenic Nerve Palsy:** • 100% occurrence with Interscalene block • Causes paralysis & elevation of the hemidiaphragm	**Symptoms** Usually asymptomatic but may see • dyspnea, • ipsilateral ↓d breath sounds **Management** • Position for best respiratory function • Supplemental oxygen • Consider/rule out pneumothorax if continuing symptomatic
	Horner's Syndrome • 25-50% occurrence • Local anaesthetic spread to stellate ganglion	**Symptoms** • Ipsilateral ptosis, pupil constriction, red eye, stuffy nose, numbness **Management** • Reassure patient symptoms will dissipate as block wears off
	Recurrent Laryngeal Nerve blockade (ipsilateral) • 10-20% occurrence • More prevalent with [R]sided block	**Symptoms** • Hoarseness, difficulty swallowing **Management** • Usually temporary & resolves as block wears off
	Pneumothorax • May occur with interscalene block • Most likely to occur when block initiated but symptoms may not appear until 6-12 hours post-procedure	**Symptoms** • SOB, tachypnea, desaturation • Persistent coughing • Pleuritic chest pain **Management** • Position for best respiratory function • Supplemental oxygen • Chest x-ray • Possible CT insertion
	Neuraxial Block • **Rare** • occurs most often with initiation of block or on initiation of CPNB infusion	**Symptoms** • Bradycardia, hypotension • Bilateral anesthesia of neck & upper chest **Management** • Respiratory & hemodynamic support as per PACU standard • Stop CPNB (if applicable)
Supraclavicular	**Pneumothroax (up to 6%)** • May occur with supraclavicular block	**See Interscalene Block**
	Phrenic Nerve Palsy (40%)	
	Horner's Syndrome	
	RLN Injury (rare)	
Infraclavicular	**Pneumothorax** • Less likely	
	Phrenic Nerve Palsy • Rare	
Axillary	Non-specific	**See Table 2A: All Blocks**

BLOCK	SIDE EFFECT/COMPLICATION	ASSESSMENTS & CARE
Femoral	**Quadriceps Weakness** • expected and places patient at high risk for falls	**Symptoms** • Expect motor weakness until block resolves **Management** • Ensure patient aware re ambulating with assistance • Reassure patient symptoms will dissipate as block wears off
Sciatic	**Foot Drop** • expected and places patient at risk for tripping/falls	
Saphenous	**Motor block of Vastus Medialis (partial)** • secondary to spread of local anaesthetic → impaired knee extension (weak quad)	
Lateral Femoral Cutaneous	**Sensory block only expected**	**See All Blocks**
IV Regional (Bier)	**Peripheral Nerve Injury/Compartment Syndrome** • both due to prolonged tourniquet time	**Symptoms:** • Delayed recovery of motor/sensory function ○ function should return rapidly unless further wound infiltration given • Abnormal peripheral circulatory parameters (pulses, colour, skin temperature) • Progressive swelling of affected limb • Underlying muscle tense/hard to palpation **Management** • **Notify Surgeon & Anaesthesiology STAT** • Remove/loosen constricting dressings/tensors if able • Elevate limb to heart level (no higher) • Anticipate return to OR
Ilioinguinal and/or iliohypogastric	**Transient femoral nerve block** • secondary to LA spread via fascial planes to FN • quadriceps weakness and associated fall risk	**Symptoms;** • Sensory/motor deficit along FN distribution **Management** • Reassure patient weakness will resolve • Ensure patient aware re ambulating with assistance until sensory/motor function recovers
	Bowel perforation (rare)	**Symptoms;** • Unexplained abdominal pain, fever **Management** • Notify anaesthesiologist • Supportive care

BLOCK	SIDE EFFECT/COMPLICATION	ASSESSMENTS & CARE
TAP	**Transient femoral nerve block** • LA spreads via fascial planes to FN	**Symptoms** • Sensory/motor deficit along FN distribution **Management** • Reassure patient weakness will resolve • Ensure patient aware re ambulating with assistance until sensory/motor function recovers
	Liver Perforation/Laceration • More likely with subcostal approach	**Symptoms** • Hypotension/tachycardia • [R] upper quadrant pain, possibly with referred pain to shoulder • Abdominal rigidity & guarding **Management** • Notify anaesthesiologist • Hemodynamic support • Anticipate/prepare for further diagnostics (x-ray, CT scan, labs) and possible return to OR
	Bowel performation/hematoma	**Symptoms:** • Unexplained abdominal pain, fever **Management** • Notify anaesthesiologist • Supportive care
Paravertebral • Sensory & sympathetic block • LE motor block **NOT EXPECTED**	**Epidural/Intrathecal spread** • Highest risk at time of injection and if continuous infusion	**Symptoms:** • Sensory loss in contralateral dermatomes • Hypotension, bradycardia etc secondary to ↓ sympathetic tone **Management** • Stop infusion (if applicable) • Supportive care for hemodynamic effects
	Pleural puncture/pneumothorax	**Symptoms** • SOB, tachypnea desaturation • Persistent coughing • Pleuritic chest pain **Management** • Position for best respiratory function • Supplemental oxygen • Chest x-ray • Possible CT insertion

Figure 1: Cutaneous Innervation of Upper Extremity

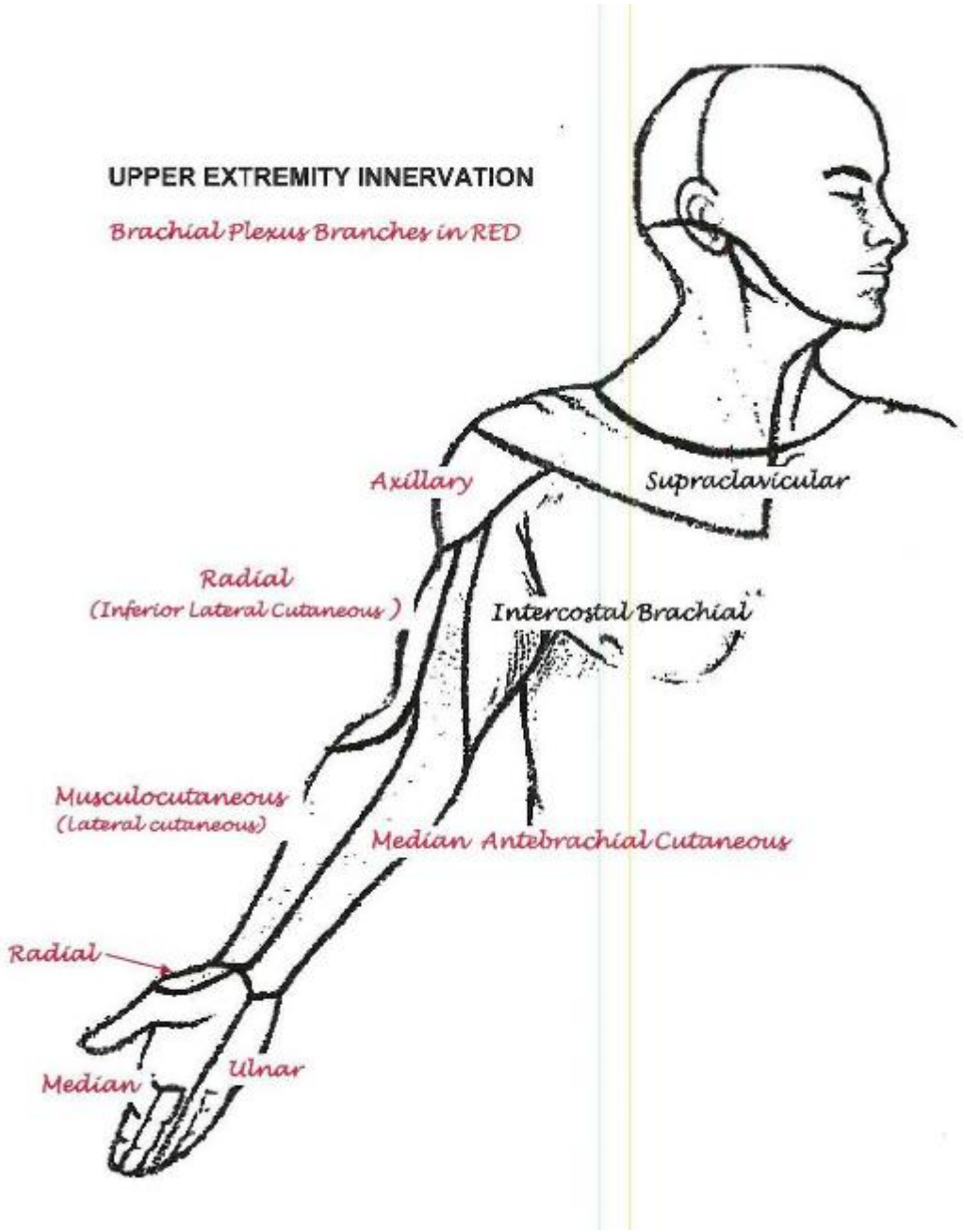


Figure 2: Cutaneous Innervation of Lower Extremity

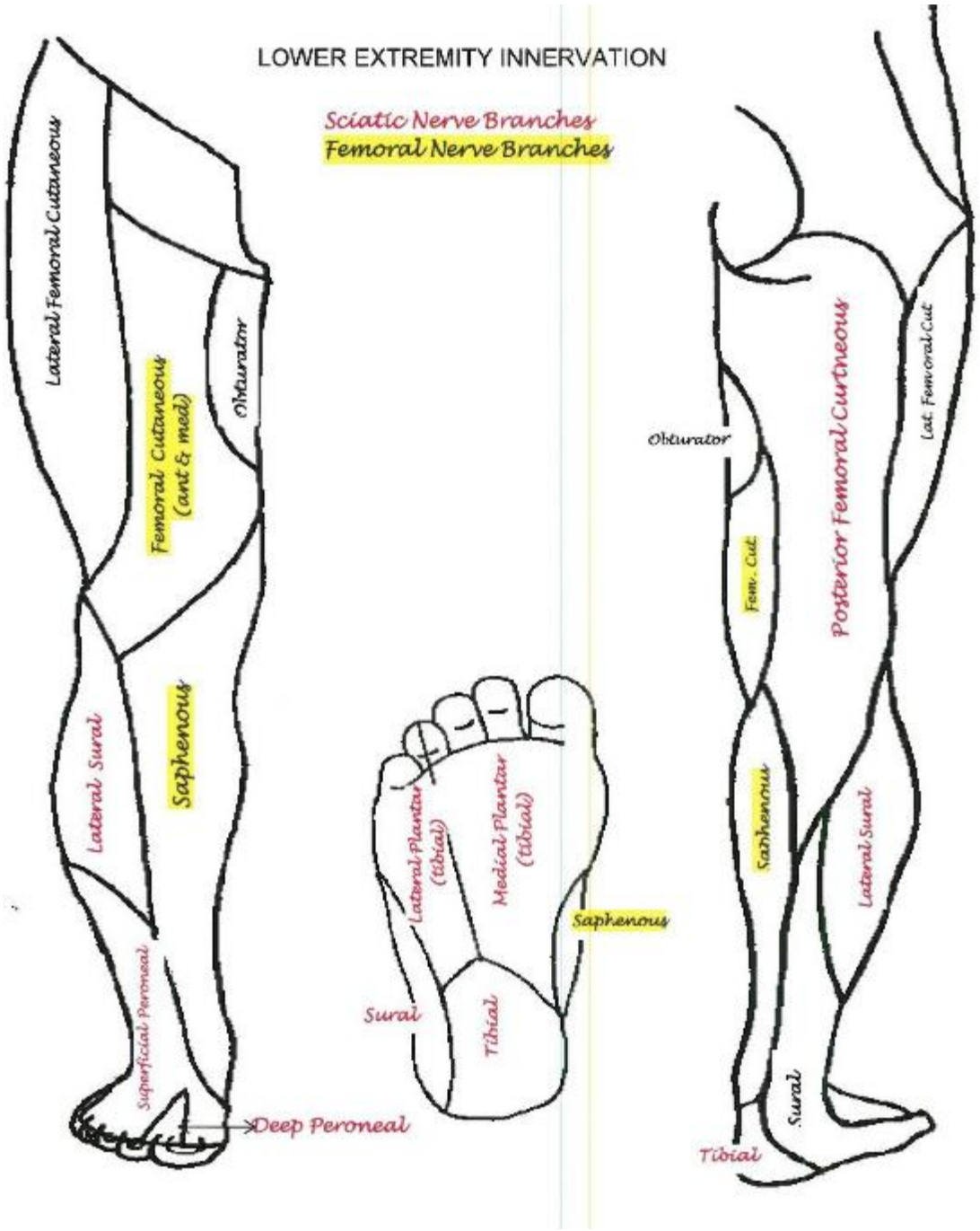


Figure 3: Cutaneous Innervation of Lower Abdominal/Upper Thigh

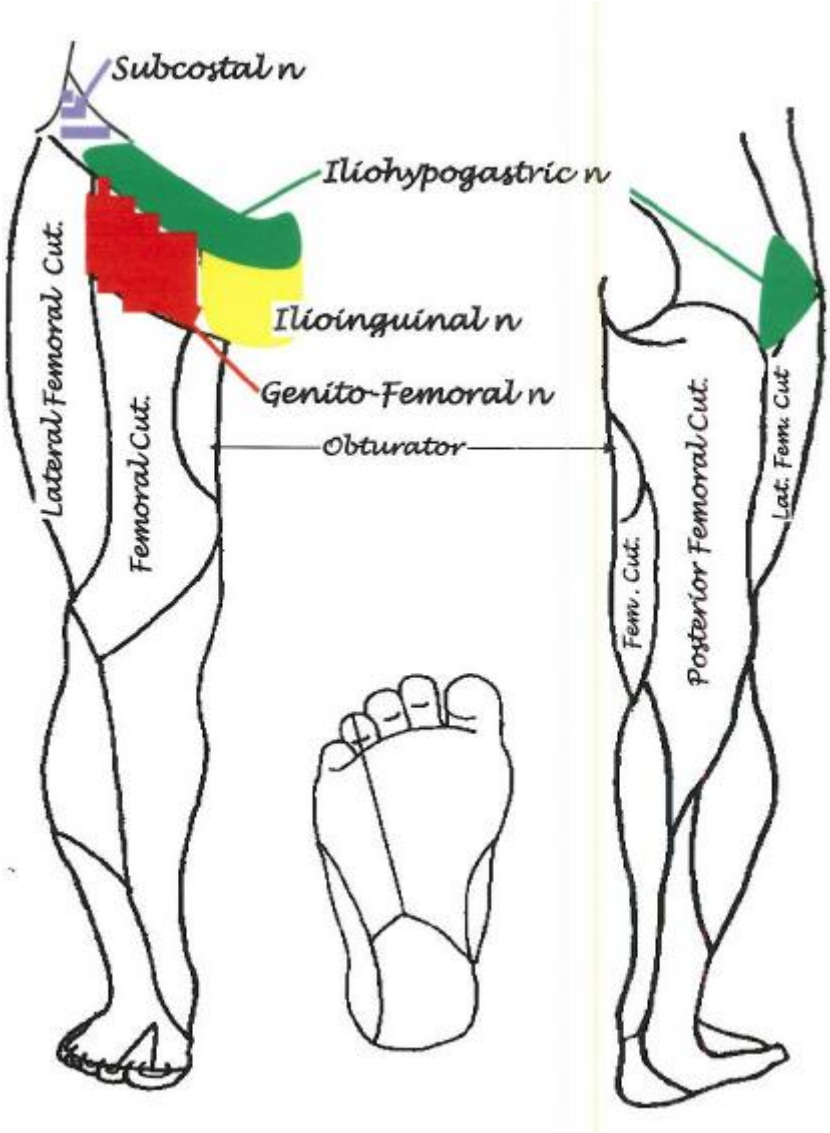


Figure 4: Limb Protection Guideline