

UNIT VI

Local Anesthesia

OBJECTIVES

After reading this chapter, you should be able to:

- Understand the indication, evidence-based guidelines and method of performing local anesthesia in primary care settings.
- Describe the purpose, common types of local anesthesia, onset and duration, strength, and maximum dose of local anesthesia.
- Delineate anesthetic methods including topical agents and local, field, and digital block anesthesia.
- Review procedural steps of performing local, field, and digital block anesthesia.
- Delineate the procedures involving the use of topical, local, field, and digital block anesthesia, and various ways in which they are performed in primary care settings.

KEY TERMS

circumferential block
digital nerve block

mental nerve block
supratrochlear nerve

supraorbital nerve block

Overview

This unit outlines the various local, field, and digital block anesthetics performed by advanced practice providers in primary care settings. It also describes in-depth pre-procedure, procedure, and post-procedure steps to guide the practitioner to practice efficiently to improve patient safety and outcome. Clinical checkpoints summarized at the end of each section provide the clinician with critical, actionable steps to ensure proper preparation, increase efficiency, and close knowledge gaps while delivering appropriate care to patients.

This unit concludes with a table of current procedural terminology (CPT) codes for billing purposes that enable clinicians to bill appropriately for procedures performed so their healthcare practice can remain profitable.

What?

Local anesthesia provides temporary and effective analgesia during common procedural skills in primary care settings and can be useful for most surgical interventions. Anesthetics are needed for diagnostic and therapeutic procedures to reduce pain during laceration

Table 6.1 Most Commonly Used Anesthetic Solutions

	Type	Onset and Duration	Strength	Maximum Dose
1	Lidocaine (Xylocaine)	Onset < 1 minute Duration: Rapid onset Longer procedures (30–90 minutes)	0.5%, 1.0%, and 2.0%	5 mg/kg Maximum dose 300 mg. 1.0% Lidocaine = 1 g Lidocaine/100 cc = 1,000 mg 300 mg = 0.03 L = 30 ml
2.	Procaine (Novocaine) Chlorprocaine (Nesacaine)	Onset 5–6 minutes Duration: Short acting (15–30 minutes)	2%–3%	Procaine—10 mg/kg with maximum dose of 1,000 mg, Chlorprocaine—Maximum dose 1 mg/kg with maximum dose of 800 mg (30 mL)
3.	Lidocaine (Xylocaine with epinephrine)	Onset < 1 minute Duration: Prolonged duration Causes vasoconstriction with decreased bleeding	0.5% and 1.0%	7 mg/kg Maximum dose 500 mg (50 mL)
4.	Bupivacaine (Marcaine)	Onset 5–10 minutes Slow onset Long duration (2–4 hours)	0.25%	Maximum dose 3 mg/kg (50 mL)

repairs, skin biopsies, and incisions/drainage, and could be used alone or in combination. Various types of local anesthetic solutions used in primary care settings are listed in **Table 6.1**. A basic understanding of pharmacologic principles, techniques, and applications is necessary for advanced practitioners. Timing and duration of the procedure should also be considered. Topical and local anesthetics could be used concomitantly to achieve optimal pain relief during procedures. Other techniques include nerve blocks and tumescent anesthesia.

6.1 Techniques Used for Local Anesthetic Administration

Topical Anesthetics

Topical anesthetics are used for local superficial dermatological procedures such as skin

biopsy and epidermal lesion removal and can be used in combination with local injectable anesthesia. Examples of topical anesthetics include EMLA (lidocaine 2.5% and prilocaine 2.5%) cream with a mixture of Lidocaine/prilocaine and Lidocaine, epinephrine, and tetracaine (LET). Topical anesthetics should be applied at least an hour before a procedure. Topical (4% Lidocaine) is gel-based with a duration of 30–60 minutes, and tetracaine is used for ophthalmic procedures that last for 60 minutes.

Local Anesthesia Infiltration

This technique is most widely used in primary care settings for minor lacerations or skin biopsies. Subcutaneous injection delivers anesthesia with slow onset, shorter duration, and increased absorption. Intradermal injections provide analgesia with rapid onset and longer duration.

6.2 Field Block Anesthesia

What?

This technique is used in primary care settings for procedures that include skin abscesses or contaminated wounds. **Circumferential block** to the area to be anesthetized is achieved by blocking innervation to the area (see **Figure 6.1**). A square or diamond-shaped field could be used. The field block technique is administered circumferentially around the wound margin using a superficial or deep approach. The anesthetic is useful for infiltrating large areas when direct infiltration is not required.

Why?

To provide analgesia during procedural skills and surgical interventions.

How?

Pre-Procedure Steps

- Check the patient's allergy history prior to administration.
- Assess anatomical landmarks and choose the appropriate technique.

- Evaluate the area for signs and symptoms of neurovascular compromise including pain, pallor, or paresthesia.

Supplies:

- Anesthetic agent (e.g., Lidocaine 1%, bupivacaine, procaine)
- Needle 27G–30G
- Syringe
- 4 × 4 gauze
- Cleansing agent (i.e., Betadine, alcohol prep, or chlorhexidine)

Procedure Steps

- Obtain signed informed consent from the patient.
- Gather supplies.
- Using the correct technique, insert the needle into subcutaneous tissue from within the wound margins and make a wheal under the skin.
- Slowly inject the area while withdrawing the needle.
- Continue along the entire wound margin to be anesthetized. Use adequate anesthetic agent to cover the area needing anesthesia.
- Anesthetize the wound with Lidocaine 1% with or without epinephrine (no epinephrine for digital block).

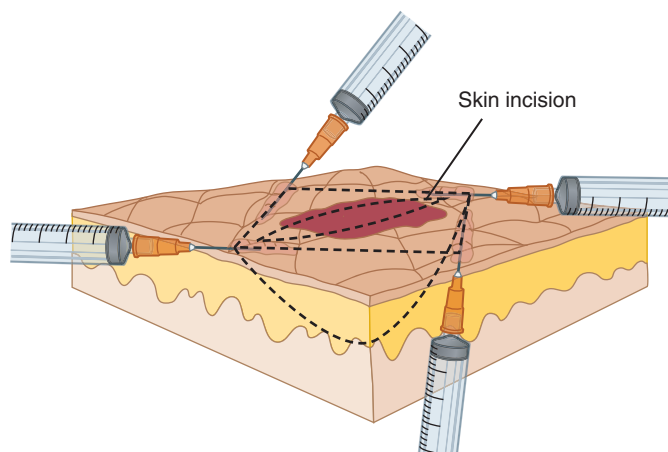


Figure 6.1 A circumferential block.

Post-Procedure

- Test the area for adequate anesthesia before beginning the procedure.
- Repeat anesthetic injection steps if patient is not fully anesthetized.

Clinical Checkpoint

- Note: Some patients will present with local anesthetic allergies, which are rare.
- Be aware that an increased dose of Lidocaine could increase toxicity and has not been found to increase the duration or onset of action.
- Caution should be taken with the use of epinephrine in patients with peripheral artery disease.
- Do not use bupivacaine (Marcaine) in pregnant patients because of the decreased venous return leading to increased bioavailability.
- Consider buffering Lidocaine with epinephrine with sodium bicarbonate (at a ratio of 9:1) to decrease pain associated with administration.

6.3 Nerve Block

What?

The **nerve block** technique is used to provide anesthesia when specific nerves are targeted. Nerve blocks are typically useful in digits and the face.

Digital nerve block is necessary when performing anesthesia to areas comprising the digits, and for nail removal, laceration repair, and reduction of fractures. To achieve anesthesia of the phalanges, the dorsal digital nerves are injected at 2- and 10-o'clock positions, and the palmar anesthesia is achieved by injecting the 4-o'clock and 8-o'clock positions. Note: To block the three middle fingers, two palmar digits need to be injected with anesthetics; to block the thumb or little finger, four

nerves, including the web space distal to the metacarpal or metatarsal, need to be injected.

Why?

To provide pain relief with anesthetic agents.

How?

Pre-Procedure Steps

- Assess anatomical landmarks and choose the appropriate technique.
- Check the patient's allergy history prior to administration.

Supplies:

- Anesthetic agent (e.g., Lidocaine 1% 0.5 mL to 1.0 mL)
- Needle 27G–30G
- Syringe
- 4 × 4 gauze
- Cleansing agent (i.e., alcohol prep or chlorhexidine)

Procedure Steps

Palmar approach-upper extremity:

- Assess to the palmar digits of the middle three fingers.
- Insert the needle at a 45-degree angle from the distal to proximal to skin over the metacarpal head.
- Ensure the needle is inserted until it touches the bone.
- Inject Lidocaine as the needle advances, and withdraw it slightly.
- Angle 4 mm medially, then 4 mm laterally and inject to ensure adequate anesthesia.

Dorsal approach:

- Assess four nerves supplying the phalanx at the level of the webspace and lateral to the proximal phalanx.
- Inject Lidocaine subcutaneously into the webspace, making a wheal to the palmar or plantar surface (see **Figure 6.2**).
- Repeat the steps until adequate analgesia is achieved.



Figure 6.2 Digital block of the webspace.

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Figure 6.3 A three-sided nerve block.

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Three-sided digital block lower extremity:

- Insert the needle at a 90-degree angle at the medial aspect of the digit, distal to the metatarsal-phalangeal joint, and inject the anesthetic as the needle is advanced toward the plantar side (see **Figure 6.3**).

- Slowly withdraw the needle, redirect it medially, and advance from the medial to the lateral side while injecting the the anesthetic.
- Withdraw the needle and inject on the lateral side of the toe.

Post Procedural Steps

- Test the area for anesthesia before beginning the procedure.
- Repeat anesthetic injection steps if patient is not fully anesthetized.

Clinical Checkpoint

- The same technique is used for digital block of the fingers and toes.
- Note: Complication of the forehead block includes hematoma, eyelid swelling and ecchymosis to the periorbital area, persistent paresthesia, permanent nerve damage, and vascular injection.
- The palmar (volar) technique is less painful compared to the dorsal block.

Other Types of Nerve Blocks

The **mental nerve block** technique provides analgesia by targeting the lower lip and chin. The extraoral approach is achieved by palpating the mandible externally and inserting the needle perpendicular to the mandible toward the periosteum. Inject 2–4 mL of Lidocaine near the mental foramen.

Procedure Billing Code

Procedure	CPT/Billing Code
Injection, anesthetic agent; other peripheral nerve or branch	64450
Injection(s), anesthetic agent and/or steroid, plantar common digital nerve(s) (e.g., Morton's neuroma)	64455

The **supraorbital nerve block** can be achieved independently by administering Lidocaine approximately 2.5 cm from the midline of the face, and the **supratrochlear nerve** can be

blocked approximately 1 cm to the supraorbital notch along the orbital ridge. Alternatively, both nerves can be blocked by injecting Lidocaine to the superior border of the eyebrow.

Bibliography

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