Department of Health Government of Nunavut	NURSING POLICY, PROCEDURE AND PROTOCOLS	
	Community Health Nursing	
TITLE:	**SECTION:**	**POLICY NUMBER:**
Suturing	Clinical Procedures	11-010-00
EFFECTIVE DATE: / **REVIEW DUE:**	**REPLACES NUMBER:**	**NUMBER OF PAGES:**
February 10, 2018 / February 2021		14
APPLIES TO:		
Community Health Nurses		

POLICY 1:

Suturing requires specialized competence and training. Registered nurses, who work within the role of Community Health Nurse and have successfully completed additional training from the Nurse Educator / Delegate, may suture simple lacerations. A physician will need to be contacted for all other wound closures to discuss further interventions.

POLICY 2:

Registered nurses shall not suture lacerations inside the mouth, lacerations beyond verineal border, lacerations to the scrotum and penis, below the eye brow and episiotomy repairs. These conditions require physician consultation

POLICY 3:

A thorough history and assessment shall be retrieved prior to wound care to determine appropriateness of suturing. There are some incidences where the wounds must not be sutured. These include, but are not limited to:

1. **Wounds will not be closed with sutures if more than 6 to 8 hours has elapsed since the time of injury.**
2. **Wounds which potentially had contact with seal contaminants (e.g. ulu used to cut seal meat and/or skins) – due to the risk of developing seal finger**
3. **Wounds which cannot be assessed and adequately explored.**
4. **Wounds which cannot be cleansed, irrigated and debrided adequately shall not be closed.**
5. **Wounds with underlying structural damage. For example, cut to tendon, nerve, bone or blood vessels.**
6. **Wounds that require multiple layer closure.**
7. **Compression or crush injuries with extensive soft tissue damage.**
8. **Injection injuries caused by high-pressure equipment (e.g. paint guns)**
9. **Wounds of the face where there is a concern about cosmetic outcome.**
10. **Hand wounds with damage to flexor tendons or nerves, with open fractures, or with joint penetration.**
11. **Wounds associated with fractures.**
12. **All animal bites should be discussed with the CMOH and/or physician.**

The on-call physician shall be consulted in these incidents to discuss further treatment options.

DEFINITIONS:

Suturing is a method for closing cutaneous wounds

PRINCIPLES:

- Proper suturing technique is needed to ensure good results.
- The choice of suture technique depends on the type and anatomic location of the wound, the thickness of the skin, the degree of tension and the desired cosmetic result.

RELATED POLICIES, GUIDELINES AND LEGISLATION:

Policy 11-009-00	Anaesthesia: Topical, Local and Digital Nerve Block
Procedure 11-009-01	Application of Topical & Local Anesthesia
Reference 11-010-01	Basic Suturing Principles
Procedure 11-010-002	Suturing Simple Lacerations

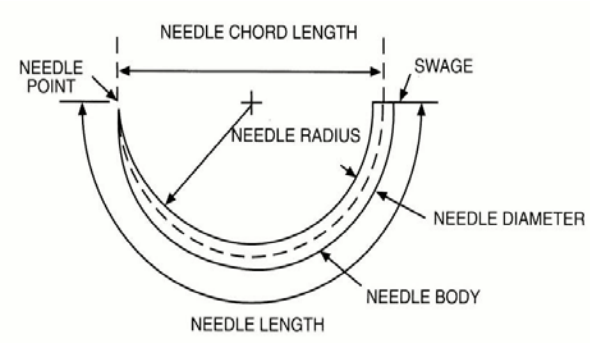
REFERENCES:

Edmunds, MW & Mayhew, MS (2003). *Procedures for Primary Care Practitioners*, 2nd ed. Mosby: St. Louis.

Ratner, D. (2009). *Suturing Techniques*.

Thomsen, TW., Barclay, DA. & Setnik, GS (2006). Basic Laceration Repair. New England Journal of Medicine: 355.

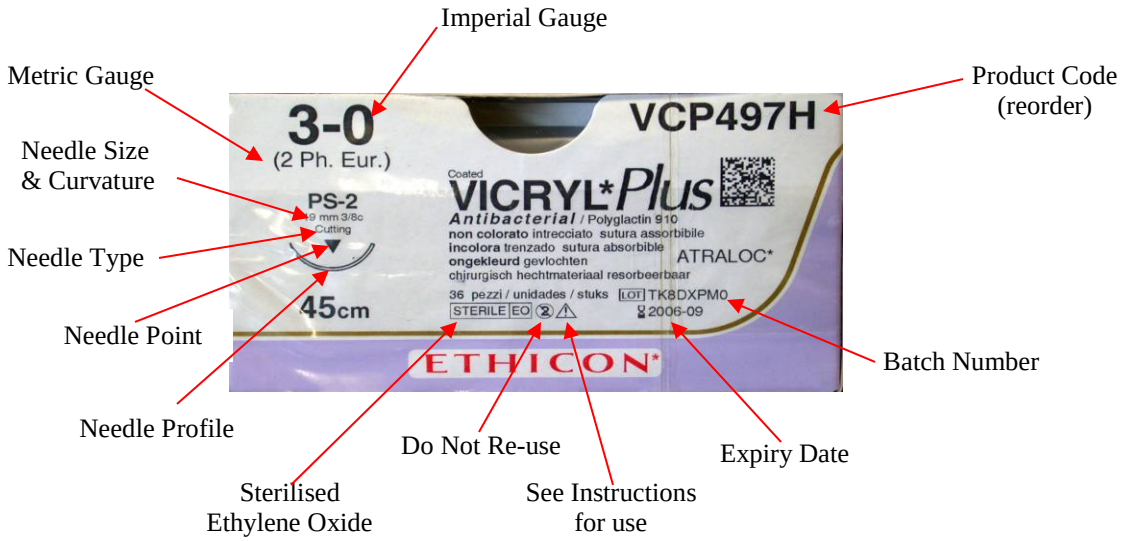
NEEDLE CONSTRUCTION



Adapted from Ethicon suturing presentation.

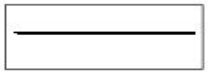
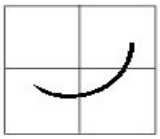
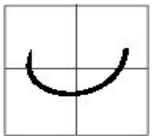
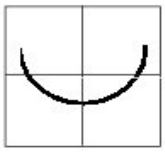
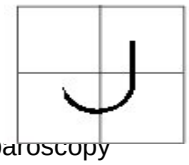
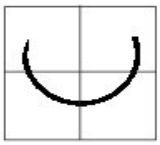
Needle Point: Penetration of a needle is dependent on the point.
Chord Length: Straight line from the point of a curved needle to the swage. Length determines the width of bite taken by the needle.
Swage: The area where suture attaches to the needle. It is the weakest point of the needle.
The swage area reduces additional trauma by achieving the closest one to one suture needle ratio.
Needle Diameter: The gauge of the needle wire.
Needle Radius: If the curvature of the needle were to continue to make a full circle, the radius of the curvature is the distance from the centre of the circle to the body of the needle.

PACKAGING



Adapted from Ethicon information inserts and suturing presentation.

NEEDLE SHAPES

NEEDLE SHAPES			
1/4 Circle  Eye Microsurgery	Straight  Nasal cavity Nerve Skin Tendon	3/8 Circle  Dura Eye Fascia Nerve	Compound Curve  Eye (Anterior segment)
1/2 Circle  Mus Eye Skin Peritoneum	J Shape  Laparoscopy	5/8 Circle  Car Oral Pelvis Urogenital tract	

3/8 Circle and the ½ Circle needle shapes are most commonly used needles in the health centres.

COMMON SUTURING MATERIALS

COMMON SUTURE MATERIALS STOCKED IN COMMUNITY HEALTH CENTRES				
	Skin (interrupted)	**Skin (Subcuticular)**	**Buried**	**Removal**
Face	5-0 or 6-0 nylon **OR** Prolene	4-0 or 5-0 Prolene	4-0 or 5-0 Synthetic absorbable **OR** 6-0 clear nylon	4-7 days
Extremities, trunk	4-0 or 5-0 nylon **OR** Prolene	3-0 or 4-0 synthetic absorbable	4-0 Prolene **OR** 3-0 or 4-0 synthetic absorbable	7-14 days

Adapted from Pfenninger, JL & Fowler, GC (1994). *Procedures for Primary Care Physicians*. Mosby: St. Louis

COMMON NON-ABSORBABLE SUTURE MATERIALS						
Suture	**Types**	**Material**	**Use**	**Tissue Reaction**	**Absorption Rate**	**Strength Retention**
Polypropylene (Prolene)	Mono	Synthetic polymer	Skin, vascular, plastic surgery	Minimal	Never	Indefinite
Nylon (Ethilon, Dermalon)	Mono	Synthetic polymer	Skin	Very Low	20% a year	Loses 20% a year
Silk	Braided	Silkworm spun fiber	Ligating, some skin but rarely used	Moderate	2 years	Gone in 1 year

Adapted from: Edmunds, MW & Mayhew, MS (2003). *Procedures for Primary Care Practitioners*, 2nd ed. Mosby: St. Louis.

COMMON ABSORBABLE SUTURE MATERIALS IN COMMUNITY HEALTH CENTRES						
Suture	**Types**	**Makeup**	**Use**	**Tissue Reaction**	**Absorption Rate**	**Strength Retention**
Gut	Plain	Mammalian collagen	Superficial vessels & quick healing subcutaneous tissues	Moderate	70 days	7-10 days
Gut	Chromic	Mammalian collagen	Versatile; good in presence of infection; (not for skin due to risk of reaction	Moderate	90 days	21-28 days
Polyglactic Acid (Vicryl)	Braided	Coated polymer	Subcutaneous skin; buried sutures	mild	60-90 days	60% in 14days 30% in 21days
Polyglycolic Acid	Mono	Synthetic polymer	Buried sutures; good tensile and knot strength	mild	40% 7 days	20% in 15days 5% in 28 days

Adapted from: Edmunds, MW & Mayhew, MS (2003). *Procedures for Primary Care Practitioners*, 2nd ed. Mosby: St. Louis.

1. **Simple Interrupted Dermal Suture:**
    a. Approximate the wound edges or hold them slightly everted.
    b. Using the needle holder, take a "bite" at the edge of the wound with the needle, entering the skin at a 90-degree angle and continuously using a curving motion of the wrist to drive the needle through the wound and out the opposite side. The stitch should be as wide as it is deep. Check to see that the wound is symmetrically approximated before tying. The suture is tied using an instrument tie. When tying the suture, pull tight enough to approximate the wound edges and slightly evert them. If there is excessive skin tension, it may be necessary to remove the stitch and to further undermine the skin. Continue to place sutures to close the wound, spacing them a distance equal to the distance between the entrance and exit sites of each suture.
2. **Subcutaneous Suture (Deeper, Layered Closure)**
    a. Usually an absorbable suture is used for subcutaneous sutures.
    b. The knot is buried or inverted to aid in approximation of the skin edges.
    c. Begin the stitch in the bottom of the wound, coming out through the dermis, then entering the dermis from the opposite side, and then coming out deep below the dermis. Use an instrument tie, but do not use a locking wrap on your first tie, and use only two or three knots. This reduces the "bulk" from the knots below the skin.
3. **Vertical Mattress Suture**
    a. This suture is strong stitch that helps to evert the wound edges.
    b. Take a large bite of tissue about 10mm away from the wound edge, proceeding as with a simple interrupted suture through the wound and out the opposite side of the wound.
    c. Reverse the needle and take a small bite 1 to 2 mm from the wound edge where the needle just came out, through the wound, coming out with a small bite on the opposite side of the wound just 1 to 2 mm from the edge.
    d. Tie the suture using an instrument tie.
    e. General wound care and apply dressing as appropriate.

PLACING SUTURES

1. The needle holder is held in the palm of the dominant hand with the thumb and the fourth fingers placed into the loops and by placing the index finger on the fulcrum to provide stability.

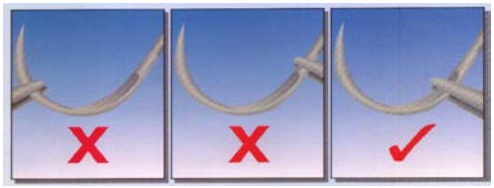
   Do not put your fingers through the loops of the driver while suturing; this interferes with proper technique. You may put your fingers into the holes when opening the driver and while tying knots.

2. Alternatively, the needle holder may be held in the palm to increase dexterity.

3. Hold the forceps in your non-dominant hand.

4. Grasp needle with the needle holder. Incorrect placement of the needle in the needle holder may result in a bent needle and/or an undesirable angle of entry into the tissue.

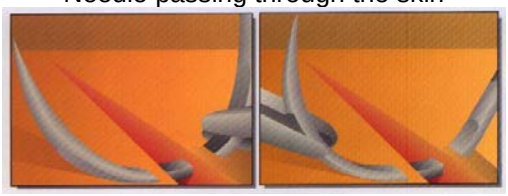
5. In most cases, the wound should be closed in segments, beginning with a stitch in the center of the laceration. Subsequent stitches are placed to bisect each resulting segment. This method allows accurate opposition of wound edges. For smaller lacerations, the sutures may be placed in an end-to-end fashion.

6. Gently grasp the tissue with the forceps to stabilize it for suture placement. Excessive trauma to the tissue should be avoided to reduce the possibility of tissue strangulation and necrosis.

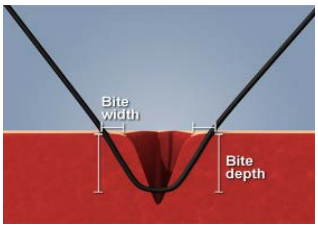
7. The needle should penetrate the skin at a 90° angle, minimizing the size of the entry wound and promoting eversion of the skin edges.

   a. The needle should be inserted 1-3 mm from the wound edge, depending on skin thickness. The depth and angle of the suture depends on the particular suturing technique (see *specific suture types*).

   Needle passing through the skin

   b. Stabilize the needle in the centre of the laceration and reload the needle onto the needle holder. Gently evert the wound edge closest to you with the forceps, and then drive the needle first through the subcutaneous tissue and then through the epidermis by supinating your wrist.



c. Match both the bite depth and bite width on both sides of the laceration. The 2 sides of the suture should become mirror images, and the needle should also exit the skin perpendicular to the skin surface.

8. Pull the suture material through the laceration so that a 3-cm tail remains on the opposite side.

9. As you progress with the repair and the wound edges become approximated, you can drive the needle through both sides of the laceration in a single pass, again using a gentle supination of the wrist.

KNOT TYING

- Three square knots will secure a stitch made with silk or other braided, non-absorbable materials;
- Four knots are sufficient for synthetic, absorbable and non-absorbable monofilament sutures as long as they are carefully squared during tying.
- Excessive number of throws in a knot weakens the suture at the knot.

1. Place the needle holder parallel over the laceration. Use a free hand to wrap the long end of the suture material (the one attached to the needle) over the needle driver twice. Rotate the needle driver 90 degrees toward the free end of the suture, grasp it, and gently pull it through.
    a. Tighten the knot just enough so that the wound edges are approximated;
    b. Too much tension at this stage can cause necrosis of the wound edges.

2. For the next throw, again place the needle holder parallel over the wound. Wrap the long end of the suture material over the needle driver once, rotate the holder 90 degrees, grasp the free end of the suture, and pull it through. This throw can be tightened without creating excessive tension on the wound edges. Place two more throws in this fashion.

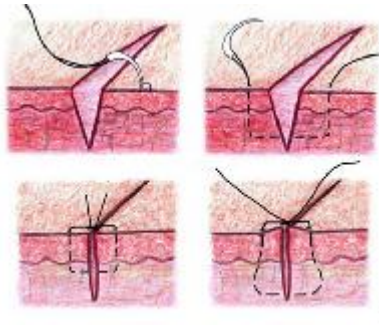
3. After the final throw, pull the knot closed just enough to approximate the wound edges. (Remember that the wound edges will swell over the next several days and the knots will become tighter. Knots that are pulled too tightly may lead to wound edge ischemia and infection.)

4. Use the suture scissors to cut the suture material, leaving tails of approximately 1 cm.

PROCEDURE: SIMPLE INTERRUPTED SUTURES

The most commonly used suture in the health centre.

1. This suture is placed by inserting the needle perpendicular to the epidermis, traversing the epidermis and the full thickness of the dermis, and exiting perpendicular to the epidermis on the opposite side of the wound.

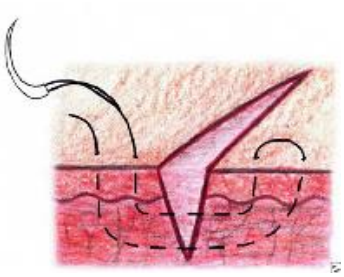


2. The 2 sides of the stitch should be symmetrically placed in terms of depth and width. In general, the suture should be wider at its base than at its superficial portion to avoid eversion of wound edges and a depressed scar.

PROCEDURE: VERTICAL MATTRESS SUTURES

The vertical mattress suture is a variation of the simple interrupted suture.

1. It consists of a simple interrupted stitch placed wide and deep into the wound edge and a second more superficial interrupted stitch placed closer to the wound edge and in the opposite direction.



2. The width of the stitch should be increased in proportion to the amount of tension on the wound. That is, the higher the tension, the wider the stitch.

3. A vertical mattress suture is especially useful in maximizing wound eversion, reducing dead space, and minimizing tension across the wound.

4. One of the disadvantages of this suture is crosshatching. The risk of crosshatching is greater because of increased tension across the wound and the 4 entry and exit points of the stitch in the skin.

5. The recommended time for removal of this suture is 5-7 days (before formation of epithelial suture tracks is complete) to reduce the risk of scarring.

6. Placing each stitch precisely and taking symmetric bites is especially important with this suture.

REFERENCES:

Edmunds, MW & Mayhew, MS (2003). *Procedures for Primary Care Practitioners*, 2nd ed. Mosby: St. Louis.

MacKay-Wiggan, J. & Ratner, D. (2009). *Suturing Techniques*.

Ratner, D. (2009). *Suturing Techniques*.

Thomsen, TW., Barclay, DA. & Setnik, GS (2006). Basic Laceration Repair. New England Journal of Medicine: 355.

PROCEDURE 11-010-02

NURSING CONSIDERATIONS:

Registered nurses shall perform suturing only to simple lacerations. All other wounds must be consulted with a physician.

1. Control of bleeding is the first priority, as well as assessing the ABCs

2. All lacerations must be thoroughly inspected for damage to underlying structures, such as tendons or bones, as well as for foreign bodies. Obtain a good history of the incident and past medical history, including immunization status (ensure Tetanus is up to date).

3. Devitalized tissue should be debrided before a wound is closed, which appears with a blue or black appearance and is often shredded. Only simple debridement shall be performed by the registered nurse.

4. Remove all rings and other jewelry from injured hands or fingers.

5. Wounds under considerable tension should have sutures placed closer to each other (and with a smaller bite width) to decrease tension exerted by the sutures.

6. Wounds should be closed in layers – deep fascia to deep fascia, superficial fascia to superficial fascia, and dermis to dermis – approximating each layer as the wound is closed.

7. Wound edges should be closed with minimal tension and with slight eversion of wound edges so that as healing takes place and the scar contracts, the resulting site is flat.

8. Synthetic monofilament sutures have the troublesome property of "memory" – a tendency of the filament to spring back to its original shape, which causes the knot to slip and unravel.

9. Follow the guidelines and protocols contained within the *Communicable Disease Manual* for post wound care. For example, dog bite protocol.

ALTERNATE TREATMENT:

1. Leave wound open to heal by secondary intention

2. For appropriate wounds, apply Dermabond® topical skin adhesive to achieve wound closure.

3. Refer for treatment and/or closure by a surgeon or other experienced colleague

4. For superficial wounds, Steri-strips® may be applied to close the wound.

EQUIPMENT
✓ Anesthesia supplies (as per Procedure 11-009-01) Irrigation supplies: ✓ Bottle of normal saline or IV bag of normal saline (size depends on the size of the wound(s) and amount of contamination. ✓ 20ml syringe with large bore IV catheter (needle removed) ✓ Non sterile gloves Suture tray: ✓ Sterile 2 X 2 gauze (at least 8 to 10) ✓ Needle holder ✓ Suture scissors (Iris scissors) ✓ Tissue forceps ✓ Curved mosquito clamp ✓ Sterile fenestrated drapes ✓ Sterile bowl Suture materials: ✓ Sterile gloves ✓ Personal protective equipment as necessary (eye and face protection and protective gown) ✓ Skin cleansing agent (e.g. 10% povidone-iodine solution or chlorhexidine gluconate solution) ✓ Appropriate suture selection ✓ Appropriate needle selection ✓ Antibiotic ointment as required

PROCEDURE:

1. Position client on the stretcher, at a height that is comfortable for you. The laceration should be well lit, preferably with an overhead procedure light, and your equipment should be within easy reach.

2. Assemble equipment, perform hand hygiene and apply gloves.

3. Clean, irrigate and explore wound (may not be able to explore wound until area anesthetized).

    a. Irrigate wound with copious amounts of normal saline solution.

    b. A large (20ml) syringe with a large bore IV catheter (needle removed) is effective in forcing gout bacteria and debris from the wound.

    c. Vigorous irrigation is required to remove bacteria and particulate matter. Irrigation should continue until all visible, loose particulate matter has been removed.

4. Prepare wound by scrubbing a wide area of skin surrounding the wound with an antiseptic solution (e.g. 10% povidone-iodine solution or chlorhexidine gluconate) to remove contaminants.

    a. It is important to remove all particulate matter; any material left in the dermis may become impregnated in the healed tissue and result in a disfiguring "tattoo" effect.

    b. Avoid introducing any cleansing agent directly into the wound because many are toxic to local tissues and may interfere with wound healing.

5. Anesthetize the region (as per Procedure 11-009-01).

6. Place a single fenestrated drape or multiple folded drapes over the wound site.

7. Explore the entire depth and the full extent of the wound under direct visualization with good lighting in a bloodless field. Attempt to locate hidden foreign bodies, particulate matter, bone fragments, and any injuries to underlying structures that may require repair (e.g. tendons, ligaments, blood vessels). A metal probe or forceps will assist in the identification of deep structures and foreign bodies.

8. Debride devitalized areas as needed. If devitalized areas are extensive, a physician must be consulted.

9. Place sutures as outline in 11-010-01: *Basic Suturing Principles*.

10. The total number of **sutures** will vary by laceration. Enough sutures should be placed so that the wound edges are fully approximated. In general, the spacing between sutures should be equal to the bite width. Avoid placing an excessive number of sutures, which may increase the risk for infection and unnecessarily injure delicate tissues.

11. Administer tetanus prophylaxis in accordance with the *Nunavut Immunization Guide*.

APPLY A WOUND DRESSING

1. After wound repair, gently wipe away dried blood on the skin surface with moistened gauze to minimize subsequent itching and cover the wound with a non-adherent dressing.
2. The type of dressing will depend on the wound characteristics and the type of repair done.

    a. A dressing may involve a simple dry gauze pad or a complex multilayer dressing.

    b. Some wounds, such as sutured scalp lacerations, do not routinely require any dressing.

3. Apply topical antibiotic preparations on wound surfaces are as clinically indicated and in accordance with the *Nunavut Formulary*.

IMMOBILIZE THE INJURY

1. Wounds and sutured lacerations may be immobilization to promote healing and comfort.
2. Wounds overlying joints are subjected to repeated stretching and movement, which delays healing, widens the scar, and could possibly disrupt the sutures
3. Splints are useful for::

    a. Lacerations that overlay joints;
    b. Protection of wounds involving fingers, hands, wrists, the volar aspects of forearms, the extensor surfaces of elbows, the posterior aspects of legs, the plantar surfaces of feet; and
    c. Extremities when skin grafts have been applied.

SUTURE REMOVAL

- Remove sutures on the face on the fifth day following the injury, or remove alternate sutures on the third day and the remainder on the fifth day.
- On the extremities and the anterior aspect of the trunk, leave sutures in place for approximately 7 days to prevent wound disruption.
- Leave sutures on the scalp, back, feet, and hands and over the joints in place for 10 to 14 days, even though permanent stitch marks may result.

REFERENCES:

Edmunds, MW & Mayhew, MS (2003). *Procedures for Primary Care Practitioners*, 2nd ed. Mosby: St. Louis.

MacKay-Wiggan, J. & Ratner, D. (2009). *Suturing Techniques*.

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Thomsen, TW., Barclay, DA. & Setnik, GS (2006). Basic Laceration Repair. *New England Journal of Medicine*: 355.

Approved by:	Effective Date:
11 FEB 2011 **Chief Nursing Officer** **Date**	April 1, 2011
February 11, 2011 **Deputy Minister of Health and Social Services** **Date**	