SECTION 6 – ADMINISTRATION OF BIOLOGICAL PRODUCTS

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1.0 DEFINITIONS

**Infant** - Birth up to the age of 12 months

**Toddler** - Age 12 months up to the age of 3 years

**Preschooler** - Age 3 years to the age of 5 years

**Subcutaneous Injection** - Injection of a biological product into the layer of fatty tissue between the skin and muscle

**Intramuscular Injection** - Injection of a biological product into muscular tissue

**Intradermal Injection** - Injection of a minimal quantity (0.01 ml-0.1 ml) of a biological product just under the dermis

**Oral** – Administration of vaccine product into the side of the mouth in between the cheek and gums.

**Intranasal** – Administration of vaccine product into the nares.
2.0 PREPARATION FOR ADMINISTRATION OF BIOLOGICAL PRODUCTS

2.1 PRODUCT PREPARATION

For the administration of particular products, review guidelines in the Yukon Immunization Program Manual, Section 8, Biological Products.

Prepare necessary materials (e.g. sterile syringe/needle, 70% isopropyl alcohol, sharps container, supplies for the management of anaphylaxis). Check the expiration date on the needle/syringe, if present (1).

When administering any biological product, consider the 7 “Rights” of medication administration (i.e. right client, right schedule, right reason, right vaccine, right dose, right route, and right documentation) (2). See 7 R's for Vaccine Administration.

Check the characteristics of the product to be administered:

- Correct product, form of presentation and expiry date. Check three times that it is the correct product:
  1. When removing from fridge/biological cooler
  2. When drawing up/reconstituting
  3. Prior to administration
- Correct formulation and presentation. Ensure product being administered is correct formulation (e.g., hepatitis B vaccine is available in pediatric or adult formulation) and correct presentation (e.g., influenza vaccine is available in injectable and intranasal presentations).
- Expected appearance: are there any irregularities (e.g., particulate matter, damage)?
- Expiry date. If only the month and year are provided for the expiry date, the biological product can be used to the end of that month.
- If a previously opened multi-dose vial, check the date that the vial was opened (as recorded on the label). Multi-dose vials must be used within 30 days of opening, unless the manufacturer specifies a different viable time period.
7 R's for Vaccine Administration

Vaccines are to be immediately entered in Panorama after they are administered to the client.
Vaccines are to be prepared in a quiet area- away from client activity.

The 7 R's apply when administering any vaccine.

<table>
<thead>
<tr>
<th>7R's of Vaccine Administration</th>
<th>Tips</th>
</tr>
</thead>
</table>
| **1. Right CLIENT**           | Verified by DOB  
|                               | Verified by parent or client  
|                               | Ensure you have pulled up the correct client record |
| **2. Right SCHEDULE**         | Review immunization history and Immunization Profile  
|                               | Print the Immunization Summary page if required  
|                               | Review paper records if required  
|                               | Verify with client/parent/guardian that no vaccines have been administered in another jurisdiction  
|                               | Obtain out of territory immunization histories prior to administering ANY vaccine  
|                               | Consult a senior colleague to verify schedule |
| **3. Right REASON**           | Verified by determining routine schedule vs. high risk schedule |
| **4. Right VACCINE**          | Verified by checking vaccine product 3 times  
|                               | When different vaccine products are used for different age groups, ensure you have the right product! |
| **5. Right DOSE**             | Verified through Section 8, Biological Products |
| **6. Right ROUTE**            | Verified through Section 8, Biological Products |
| **7. Right DOCUMENTATION**    | Documented on correct file and immediately after vaccine is administered |

When administering more than one vaccine, the MULTIPLE injection tray will always be used. Prepare vaccines only when the 7 R’s have been reviewed. Prepare vaccines immediately prior to administration.

Take time to review immunization histories, schedules, preparing & administering vaccines.
2.2 **INFORMED CONSENT**

Informed consent is an essential pre-condition to providing immunization. It is the professional and legal responsibility of the provider to obtain informed consent prior to immunization. Refer to the [Yukon Immunization Program Manual, Section 2, Informed Consent](#).

Note the following are elements of informed consent:

- specific to immunization service
- client-centered
- voluntary
- obtained without fraud or misrepresentation
- assesses client's capability
- provides standard information
- provides client time to ask questions and receive answers
- gives client the right to refuse or revoke consent

2.3 **CLIENT ASSESSMENT**

Verify the client using two identifiers (e.g., name and date of birth) (3,4). Review client's record to determine which biological products client is eligible for at this visit. Ask client or parent/guardian about all relevant contraindications and precautions to receiving the biological product, including history of anaphylaxis and history of fainting.

**Note that the only contraindications to all vaccines approved in Canada are: anaphylaxis to a component of the vaccine; significant immunosuppression (live vaccines only); and pregnancy (live vaccines only)** (5). Review precautions for each biological product in the [Yukon Immunization Program Manual, Section 8, Biological Products](#).

To reduce the likelihood of fainting (and the possibility of injuries), consider the following measures to lower stress in those awaiting immunization (6):

- Seat every client prior to immunization
- Maintain a comfortably cool room temperature and if possible, plenty of fresh air
- Avoid long line ups in mass immunization clinics
- Prepare biological product(s) out of view of recipients
- Provide privacy during immunization
- If client is anxious and pale, have them lie down with legs elevated
- Apply cold wet cloth to face.
2.4 VACCINATION FOLLOWING VACCINE ADMINISTRATION ERRORS

2.4.1 Vaccine Given at Less than the Minimum Interval
Consider a vaccine dose given at less than the minimum interval to be an invalid dose and repeat the dose.

- The repeat dose should be spaced after the invalid dose by the recommended minimum interval for the specific dose of that vaccine.
- Refer to Yukon Immunization Program, Section 3, Minimum Intervals Between Vaccine Doses Table.

2.4.2 Vaccine Given at Less than the Minimum Age
Consider a vaccine dose given at less than the minimum age to be an invalid dose and repeat the dose.

- Live vaccine (e.g., MMR or varicella): Repeat the dose when the child reaches the minimum age and at least 4 weeks after the dose that was given too early.
- Inactivated vaccine (e.g., INFANRIX hexa®): Repeat the dose when the child reaches the minimum age.

2.4.3 Live Vaccines Given Less than 4 Weeks Apart
If two live parenteral vaccines are not given on the same day and are given less than four weeks apart, consider the vaccine that was given second to be invalid.

- Repeat the vaccine that was given second a minimum of 28 days after it was given.

2.4.4 Expired vaccine
If an expired product is given inadvertently, the dose must be repeated.

- If it is a live vaccine, give on the same day the expired vaccine was given. If the error is discovered after that, repeat the dose of live vaccine 28 days later.
- If an expired dose of an inactivated product is given, give another dose as soon as possible.
3.0 CONSIDERATIONS FOR THE SCHEDULING AND ADMINISTRATION OF MULTIPLE INJECTIONS

"Vaccine providers should use all clinical opportunities to screen for needed vaccines and to administer all vaccine doses for which a vaccine recipient is eligible at the time of each visit" This is Guideline 3 of the National Guidelines for Immunization Practices (7). Adherence to this standard of practice will avoid a missed opportunity for immunization and the inherent possibility of the individual contracting a vaccine preventable disease in the intervening period of time. Individuals should be fully immunized at the appropriate age. The practice also results in fewer periods of discomfort for the client and fewer office visits with decreased time and cost factors for both clients and health care providers.

There are no contraindications to giving multiple injections of vaccines at the same clinic visit (7). There is no increase in side effects, reduced vaccine effectiveness, or reduced parental compliance.

When two or more biological products are to be administered, it is preferable, but not necessary, to use different limbs (9). Use of different limbs assists in differentiation of local adverse events following immunization.

Give biological products that are known to cause more stinging and/or pain last (e.g., give INFANRIX hexa® first, followed by Prevnar®). Give MMRII™ last (6, 8). Published pain-related data are not available for other vaccines.

When a vaccine and immune globulin product are being administered, separate limbs must be used.

When administering two or more biological products in the same limb, separate the injections by 2.5 cm (1") so that local reactions are unlikely to overlap.

When administering multiple vaccines intramuscularly, the vastus lateralis or deltoid muscle may be used.

- For infants less than 12 months of age, the thigh (vastus lateralis) is the preferred site for more than one IM injection because of its greater muscle mass. The thigh may also be used at any other age.
- For infants ≥ 12 months, older children and adults, the deltoid is the preferred site for more than one IM injection, providing there is adequate muscle mass. Ensure the biological product is being administered in the correct site by checking Section 8 Biological Products (i.e. MMR vaccine is given subcutaneously).
The literature contains varying recommendations regarding the maximum number of injections and maximum total volume of all the injections to be given into one IM injection site (i.e., the vastus lateralis or the deltoid). The decision regarding number of injections and maximum volume to be administered should be based on the age and assessed muscle mass of the individual. In general:

- **Vastus lateralis:** 1.0 ml in infants; 2 ml in children ≥ 12 months to 5 years; 3 ml in children 5 years to 18 years, 5.0 ml in adults

- **Deltoid:** 1.0 ml in children ≥ 12 months to 18 years; 2.0 ml in adults

**Table 3.1: Recommended Needle Sizes, Sites and Maximum Volumes for Intramuscular Injections**

<table>
<thead>
<tr>
<th>Age</th>
<th>Site</th>
<th>Needle Length</th>
<th>Max Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;28 days</td>
<td>Vastus lateralis</td>
<td>5/8”</td>
<td>1 mL</td>
</tr>
<tr>
<td>1 month to &lt;12 months</td>
<td>Vastus lateralis</td>
<td>1”</td>
<td>1 mL</td>
</tr>
<tr>
<td>≥12 months to ≤2 years</td>
<td>Deltoid</td>
<td>7/8” – 1”</td>
<td>1 mL</td>
</tr>
<tr>
<td></td>
<td>Vastus lateralis</td>
<td>1”</td>
<td>2 mL</td>
</tr>
<tr>
<td>&gt;2 years to &lt; 5 years</td>
<td>Deltoid</td>
<td>1”</td>
<td>1 mL</td>
</tr>
<tr>
<td></td>
<td>Vastus lateralis</td>
<td>1”</td>
<td>2 mL</td>
</tr>
<tr>
<td>5 years to 18 years</td>
<td>Deltoid</td>
<td>1”</td>
<td>1 mL</td>
</tr>
<tr>
<td></td>
<td>Vastus lateralis</td>
<td>1”</td>
<td>3 mL</td>
</tr>
<tr>
<td>≥ 19 years</td>
<td>Deltoid</td>
<td>1” – 1 ½”</td>
<td>2 mL</td>
</tr>
<tr>
<td></td>
<td>Vastus lateralis</td>
<td>1” – 1 ½”</td>
<td>5 mL</td>
</tr>
</tbody>
</table>

**Note:** The 2 primary IM sites for immunization are the vastus lateralis (anterolateral thigh) and the deltoid muscles. (The ventrogluteal and dorsogluteal sites may be used for immune globulin products only (1, 9, 28-31))
4.0 DRAWING UP MULTIPLE DOSES OF A BIOLOGICAL PRODUCT

A biological product should be withdrawn from the vial by the provider administering the product. Pre-loading syringes with a biological product is discouraged because of the uncertainty of product stability in syringes, risk of contamination, increased potential for administration errors, biological product wastage and risk of needle stick injury (9).

If the decision is made to draw up multiple doses of a biological product for programmatic reasons, such as a mass influenza or disease outbreak immunization clinic, follow these guidelines:

- Check product insert. Some biological products should not be pre-drawn as they must be used immediately (e.g., varicella vaccine).

- Keep pre-drawn biological product in an insulated biological cooler at a temperature of 2° - 8° C. Avoid direct contact between the syringes and the ice pack.

- Securely attach needle caps over the needles, when possible.

- Withdraw each dose from a multi-dose vial in a sterile needle and syringe. Do not leave a needle in a multi-dose vial (10-13).

- If the needle cap becomes loose or dislodged, discard the needle and biological product-containing syringe.

- To ensure there is no tampering with pre-drawn biological product do not leave biological coolers unattended at any time.

- Discard unused pre-drawn biological products at the end of the clinic.

Clearly record the date of opening on the labels of any leftover, opened multi-dose vaccine vials.
5.0 DRAWING UP A LARGE QUANTITY OF BIOLOGICAL PRODUCT FOR INDIVIDUAL USE

In some instances, a product will need to be withdrawn from more than one vial. This may occur when drawing up immune globulin products or when more than one vial of hepatitis B vaccine is required for the individual’s dose.

In these instances, the biological product may be withdrawn from more than one vial into the same syringe provided the vials are the same lot number and expiry date.

To combine the product into one syringe (14):

- Aspirate a volume of air equivalent to the amount of product to be withdrawn from vial A and inject the air into vial A, ensuring the needle does not come into contact with product in the vial.
- Holding onto the plunger, withdraw the needle and syringe from vial A.
- Aspirate a volume of air equivalent to the amount of product to be withdrawn from vial B and inject the air into vial B.
- Immediately withdraw the quantity of product needed from vial B and withdraw the needle and syringe.
- Insert needle into vial A and withdraw quantity of product needed from vial A to obtain the full dose.
- Discard vials immediately after use, regardless of any remaining product in the vial.

In rare instances, more than one individual may be present at the same appointment and require administration of an immune globulin product supplied in vial format (e.g., Ig, HBlg, Rablg, Varlg). To avoid wastage of the product, immune globulin may be withdrawn from a single vial for more than one individual provided a new, sterile needle and syringe is used for each individual. Any immune globulin product remaining in the vial(s) following administration of the appropriate dose(s) must be discarded immediately. Refer to Table 3.4 Recommended Needle Sizes, Sites and Maximum Volumes for Intramuscular Injection for information regarding maximum volume per immunization site.
6.0 DRAWING UP BIOLOGICAL PRODUCTS IN VIAL PRESENTATION

Wash hands or cleanse with a sanitizer.

Remove the plastic cap covering the vial.

- **Note:** To avoid vaccine wastage, confirm it is the correct product before removing the plastic cap (15). In the event that the plastic cap is removed and the vial is not subsequently punctured, maintain the cold chain and use or discard the contents of the vial by the end of the clinic day (16, 17).

Cleanse the surface of the rubber stopper using a cotton pad/swab moistened with 70% isopropyl alcohol. Allow to air dry (11, 12). Gently swirl the vial immediately before removing each dose to ensure that the contents are fully dispersed.

For a product in a “ready to go” liquid presentation, draw into the syringe a volume of air equal to the quantity of biological product to be removed.

For lyophilized, or freeze-dried products (e.g., MMR) having to be reconstituted, the diluent acts as the air in the syringe so there is no need to draw air into the diluent syringe (19).

Hold/place the vial right side up and insert the needle through the centre of the rubber stopper.

Slowly inject the air or diluent from the syringe. **It is vital that you do not inject air into the multi-dose PPD (tuberculin) vial as it interferes with the stability of the biological.** See [Yukon Tuberculosis Manual Appendix C](#) for more information on TB skin tests.

If the biological product was reconstituted, gently swirl the vial to ensure the contents are fully dispersed.

Hold the vial upside down and withdraw the required quantity of biological product into the syringe.

Remove the needle from the vial and expel the air bubble(s).

It is not necessary to change needles between drawing up the biological product into the syringe and immunizing the client. Always change the needle if it is damaged, or becomes contaminated.

If it is the first entry into a multi-dose vial, record the date (include day, month and year) on the label of the vial, for products that expire within a set interval of being opened.

Partial doses from separate vials should not be combined to obtain a full dose (18), with the exception of drawing up immunoglobulin products or when more than one vial of hepatitis B vaccine is required for individual use. Refer to [5.0 Drawing Up a Large Quantity Of Biological Product For Individual Use](#).

Immediately return multi-dose vials to the refrigerator/biological cooler.
6.1 Product Reconstitution

Reconstitute vaccine according to manufacturer’s instructions, using only the diluent provided by the manufacturer for reconstitution purposes (1, 9, 19):

- Diluent may be provided in a single dose vial, single dose ampule, or preloaded syringe.
- Store diluent according to manufacturer specifications.
- Ensure the diluent and the vaccine are the correct products to be mixed together and that neither product is expired.
- Reconstitute vaccine just prior to use.
- Swab both rubber seals with isopropyl alcohol and allow alcohol to dry (13).
- Introduce the diluent into the lyophilized vaccine product vial by inserting the needle at a 45-degree angle and injecting the diluent slowly toward the side of the vial and not directly into the vaccine powder. This will prevent foaming or potential denaturing of the vaccine protein.
- Swirl or rotate the vial gently until all the powder is dissolved and solution has a consistent appearance.
- Check the appearance of the reconstituted vaccine. Ensure the color, appearance, and consistency are consistent with the product description on the product insert or product monograph.
- Best practice is to withdraw the entire volume of the reconstituted product from the vial and administer immediately.
7.0 DRAWING UP BIOLOGICAL PRODUCTS IN AMPULE PRESENTATION

Gently swirl the ampule immediately before removing the contents to ensure that the contents are fully dispersed.

Tap the ampule lightly to ensure that the contents are in the lower part of the ampule.

Using a swab moistened with isopropyl alcohol, wipe the neck area of the ampule prior to opening to prevent bacterial contamination of ampule contents (13).

Break the neck of the ampule using the alcohol swab, a clean cotton ball or a clean cotton gauze. If you cut yourself in breaking the ampule, discard the ampule, since the product may be contaminated. Wash your hands and cover the cut before continuing.

Withdraw the contents of the ampule using a sterile syringe and 25-gauge needle. It is not necessary to change needles between drawing up the biological product into the syringe and administering it to the client.

Discard the ampule into a hard sided, labeled sharps container.

Expel the air bubble(s) from the syringe.

The literature suggests there is a potential for introduction of microscopic glass shards into the contents of an ampule when it is opened. The clinical significance of intramuscular or subcutaneous administration of glass shards is not clear. There is a theoretical association between the injection of glass shards and transient local reactions. Filter needles are recommended in the literature when a medication in ampule presentation is delivered intravenously, and when a patient is receiving ongoing IM injections of a medication from an ampule (20,21).

Filter needles are not indicated for the routine administration of biological products or epinephrine. The reasons are as follows:

- There are fewer glass shards introduced to ampule contents on opening of a smaller ampule (e.g., VARILRIX® diluent), compared to a larger size ampule.
- Fewer shards will potentially be drawn into an unfiltered needle when the needle bore is smaller (i.e., high gauge needles used for vaccination).
- The practice standard of using a cotton pad when opening the ampule will reduce the risk of glass shards entering the ampule contents.
- Filter needles could potentially filter out particulate matter such as adjuvants or other active ingredients, making a vaccine less effective (9).
8.0 SYRINGES PRE-FILLED BY MANUFACTURER

Follow the steps below when using biological products that come in a pre-filled syringe (11, 22):

- Wash hands or cleanse with a sanitizer.
- Inspect packaging to ensure protective barrier is intact.
- Review lot number on box and on syringe. If packaging includes liquid vaccine as diluent for lyophilized vaccine, the lot number on the box will be used for recording purposes.
- Shake or rotate syringe according to biological product monograph instructions.
- Grasp needle-cap firmly near end where needle attaches to syringe.
- For syringes with needle attached, rotate needle-cap slowly until loosened. Slowly slide off the cap.
- For separate needles and syringes, firmly attach the needle onto the syringe with a push and clockwise twist. Use only safety-engineered needles. If the product comes with a needle without a safety engineered shield, discard the needle in a sharps disposal container and replace with a safety-engineered needle prior to use.
- Slowly eject the air bubble. If plunger is hard to push, hold syringe in one hand, and slowly rotate plunger clockwise (looking down on end of plunger) while pushing it into the barrel. (NOTE: Rotating plunger counter-clockwise may cause plunger to detach).
- If the syringe has been activated (i.e., needle-cap removed or needle attached) but unused, discard at end of clinic day (23).
9.0 STANDARD PRECAUTIONS

Glove use during immunization is not routinely recommended unless the skin on the vaccine provider’s hands is not intact or when administering Bacille Calmette-Guérin (BCG) or smallpox vaccine. If gloves are worn, they should be changed between vaccine recipients. Hand hygiene should be performed after removing gloves.

Wash hands well or use a sanitizer between clients.

To prevent accidental needle stick injury, do not recap needles.

When safety needles are used, engage safety mechanism immediately following administration of the biological product.

Immediately discard needle and attached syringe in hard sided, labeled sharps container. Place sharps container so as to avoid reaching or having to reach in front of the client. Caution should also be taken so that the sharps container cannot be reached by children in the clinic setting.

Do not empty used needles and syringes from one sharps container to another.

Report percutaneous (needle stick) injuries immediately to supervisor for consideration of possible post-exposure immunoprophylaxis. Refer to the Yukon CDC - Blood and Body Fluid Exposure Management: Guidelines. All immunization providers should have completed a full series of hepatitis B vaccine with titer levels drawn at least 1 month post completion of immunization series, to verify immunity (anti-HBs level of < 10Ul/L).
10.0 INJECTION SITES, NEEDLE SIZE AND POSITIONING

Use clinical judgment to select appropriate injection site and needle size. This assessment is based upon:

- client’s age
- volume of biological product to be administered
- viscosity of biological product
- adequacy of muscle mass
- recommended route of administration for the biological
- number of products to be administered.

After selecting the appropriate injection site, inspect the skin’s surface over the site for bruises, scars, or inflammation. Palpate site for masses, edema, or tenderness. If any of these are found at the injection site, do not use the site, as there might be interference with absorption of the biological.

Correct positioning of the client is a critical step in ensuring the biological product is administered in the correct site. Instruct the parent/guardian to hold the child such that the immunization site is clearly visible to the immunizer and the child is sufficiently restrained to prevent as much movement as possible during the immunization. Refer to the Immunize Canada website and watch the video on “holding” for tips on positioning infants before, during and after immunization. https://immunize.ca/pain-management-children

No matter how co-operative a child or infant appears to be, it is always advisable to have the client firmly restrained during the administration of all injections.

When restraining a child remember the site must be adequately exposed and accessible and all “moving parts” (arms and legs) secured without causing the child excessive discomfort.

Defer restraining a child until the biological is drawn up and you are ready to administer the vaccine, as the child will soon become uncooperative if restrained for too long.

Sometimes parents are more upset about the injection than their children. The parent’s presence is necessary to physically assist the nurse, to comfort the child when the procedure is complete and to instill confidence in the child that the parent is not abandoning them during an uncomfortable and possibly frightening experience.

It is not recommended that two vaccinators administer vaccines to a client at the same time. There is not enough evidence to support the use of this practice.
Examples of positioning for injection in the vastus lateralis:

Injection sites must be at least 2.5cm apart
Examples of positioning for injection in the deltoid:

- Injection site
- Inside arm tucked under carer’s armpit
- Carer’s hand restrains outside arm close to the child’s body
- Child positioned sideways on lap with child’s legs held between the carer’s legs
10.1 NEEDLE SIZE AND SITES FOR SUBCUTANEOUS (SC) INJECTION

Use a 25 – 27 gauge 5/8” – 7/8” needle for subcutaneous injections (1, 3, 32, 35, 36).

Sites for subcutaneous injection are the lateral aspect of the upper arm and the fatty area of the anterolateral thigh. The thigh is the site of choice for infants <12 months of age and the upper outer triceps area is recommended for all individuals ≥12 months.
10.2 NEEDLE SIZE AND SITES FOR INTRAMUSCULAR (IM) INJECTION

Use a needle length sufficient to reach the largest part of the muscle. This is to prevent the biological being deposited in subcutaneous tissue and to decrease or prevent abscess formation. The use of longer needles has also been associated with less redness and swelling at the immunization site than occurs with shorter needles.

For infants, toddlers, and older children a 7/8" - 1" needle is recommended, depending on the muscle size and the amount of subcutaneous tissue.

For adolescents and adults, a 1 – 1 1/2 " needle is usually used.

Use a 22 to 25 gauge needle depending on the viscosity of the biological product. A larger bore needle (e.g., 22 gauge) may be required when administering viscous products such as immune globulin preparations.

The IM site of choice for infants less than 12 months of age is the vastus lateralis (anterolateral thigh). It should also be considered for older children with a small deltoid muscle mass. For children ≥12 months of age and for adults, the preferred site is the deltoid muscle. When the deltoid muscle is used for children ≥12 months of age, first assess the adequacy of the muscle mass.

Assess the depth of the muscle mass to determine the needle length to be used. One way of doing this is as follows: before injecting the deltoid muscle or vastus lateralis, grasp the muscle between thumb and index finger. One half the distance between thumb and index finger will be the approximate length of the needle required to penetrate that muscle.

**Note (the following information only applies to immune globulins):**
Assessing the ventrogluteal muscle or dorsogluteal muscle requires more calculation because the muscle mass cannot be easily grasped. However, the amount of subcutaneous fat at the site can be assessed. Using thumb and index finger pick up the layer of fat and skin above the muscle. This layer of tissue moves easily over the underlying muscle. One half of the distance between thumb and index finger will be the approximate length of the needle required to reach the muscle. The client’s overall size will need to be assessed in order to decide on the length to add in order to penetrate the muscle mass. For example, frail adults may need a needle length of 1 inch; well-developed, muscular adults or obese adults will need a longer needle length.
10.2.1 Vastus lateralis (anterolateral thigh) site

This site is used for both IM and SC injections.

When immunizing an older child or adult, position client in a supine, side lying, or seated position. When immunizing an infant, have the parent/caregiver hold the infant in a "cuddle" or semi-recumbent position on their lap.

- Define the site by dividing the space between the trochanter major of the femur and the top of the knee into three parts; draw a horizontal median line along the outer surface of the thigh.
- The injection site is in the middle third, just above the horizontal line.
### 10.2.2 Deltoid site

This site is used for IM injections only (28,30,33,34).

Have the child sit sideways on the lap of the parent/caregiver. The injection arm should be held close to the infant's body while the other arm is tucked behind the parent's/caregiver's back.

To help in relaxing the muscle during the injection, the older client may be seated with their elbow bent and their forearm resting on the arm of a chair and internally rotated.

Define the site by drawing a triangle with its base at the lower edge of the acromion and its peak above the insertion of the deltoid muscle. The injection site is in **the center of the triangle**.

The upper border of the deltoid muscle is located one to two finger widths below the acromion process. The bottom point of the deltoid muscle can be located by drawing an imaginary line across the arm from the crease of the axilla at the front to the crease of the armpit in the back (28).

The target zone for injection is 4 cm below the acromion for adults. In children 3-18 years of age, injections should be given 3-5 cm below the acromion (29).
10.2.3 Ventrogluteal site

Do **not** use this site for vaccine administration.

The ventrogluteal site is the preferred site for the IM injection of large volumes of immune globulin preparations (e.g. Ig, HB Ig, Tlg, Rab Ig).

This site can be used in those over 7 months of age.

This muscle is accessible in the supine, prone, and side lying position.

The right hand is used for locating the site on the left hip; the left hand is used for locating the site on the right hip.

Place heel of the hand over the greater trochanter of the client’s hip with wrist almost perpendicular to the femur. Point the thumb toward the client’s groin and the fingers toward the client’s head. Point index finger to the anterior superior iliac spine, and extend the middle finger back along the iliac crest toward the buttock. The index finger, the middle finger, and the iliac crest form a V-shaped triangle. The injection site is the center of the triangle.
10.2.4 Dorsogluteal site

Do not use this site for vaccine administration, as it is less immunogenic for a number of vaccines, including hepatitis B and rabies vaccines.

The dorsogluteal site is only to be used for the IM injection of large volumes of immune globulin preparations when the ventrogluteal and vastus lateralis sites have had maximum volumes of an immune globulin preparation injected and an additional volume still needs to be administered. This is due to the possibility of sciatic nerve injuries when the injection is done in the dorsogluteal site.

This site should only be used in individuals over five years of age.

Place client in a prone, side lying, or standing position.

Encourage a posture that will provide muscular relaxation and reduce discomfort (i.e. turning toes inward when prone, flexing the upper leg at hip and knee when lying on the side, flexing knees and leaning upper body against a support when standing).

Define the site by dividing the buttock into 4 quadrants. The injection site is the centre of the upper outer quadrant.

Direct the needle anteriorly (i.e., if the client is lying prone, direct the needle perpendicular to the table’s surface, not perpendicular to the skin plane).
10.3 Site and needle size for intradermal injection

Use a 1 ml TB syringe and 27-gauge needle of 1/2” length.

The usual site for intradermal injections is the flexor (anterior) surface of the forearm.

Have client rest their arm on a firm surface, forearm turned up.

Because of the decreased antigenic mass administered with ID injections, attention to technique is essential to ensure that the material is not injected subcutaneously.

Rabies vaccine is administered intradermally in the upper arm over the deltoid.
11.0 ADMINISTRATION ROUTES

Routes of administration of each biological product are recommended by the manufacturer. Deviation from the recommended route of administration may reduce vaccine efficacy or increase local adverse events. Report any administration of a biological by a route other than that recommended by the manufacturer to the appropriate person in your health care setting.

11.1 ADMINISTRATION ROUTES FOR BIOLOGICAL PRODUCTS

<table>
<thead>
<tr>
<th>Intramuscular (IM)</th>
<th>Subcutaneous (SC)</th>
<th>IM or SC</th>
<th>Intradermal (ID)</th>
<th>Oral</th>
<th>Intranasal</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTaP-HB-IPV-Hib</td>
<td>IPV</td>
<td>Pneumococcal (polysaccharide)</td>
<td>Pre-exposure rabies vaccine</td>
<td>Rotavirus</td>
<td>Influenza (live attenuated)</td>
</tr>
<tr>
<td>DTaP-IPV-Hib</td>
<td>MMR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DTaP-IPV</td>
<td>Varicella</td>
<td></td>
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<tr>
<td>Haemophilus b</td>
<td>Yellow Fever</td>
<td></td>
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</tr>
<tr>
<td>Hepatitis AB</td>
<td>Zoster (Live)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>MMRV</td>
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<tr>
<td>Hepatitis B</td>
<td></td>
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<tr>
<td>HPV 9</td>
<td></td>
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<td></td>
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<tr>
<td>Immune Globulin (Ig) Preparations</td>
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<tr>
<td>Influenza</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Japanese Encephalitis</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Meningococcal C Conjugate</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Meningococcal Quadrivalent Conjugate</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal (conjugate)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rabies</td>
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<tr>
<td>Td</td>
<td></td>
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<tr>
<td>Tdap-IPV</td>
<td></td>
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<td></td>
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<tr>
<td>Tdap</td>
<td></td>
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<tr>
<td>Typhoid</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Zoster (Recombinant)</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
### 11.2 SUBCUTANEOUS (SC) INJECTION ROUTE

<table>
<thead>
<tr>
<th>PROCEDURE (3, 35, 36)</th>
<th>IMPORTANT POINTS</th>
</tr>
</thead>
</table>
| • Use correct length and size of needle. Grasp a skin fold of fatty tissue at site with thumb and forefinger. Measure skin fold from top to bottom; be sure needle is approximately one half this length.  
• Clean the site with a cotton pad/swab/ball moistened with 70% isopropyl alcohol. | • Pinching skin elevates SC tissue and ensures that needle will be injected into SC tissue.  
• Allow the skin to air dry prior to injection to avoid a burning sensation on insertion of the needle. |
| • Insert the needle quickly and firmly, with the bevel facing upwards, at a constant angle of 45°.  
• For an obese client, use a longer needle and inject at a 90° angle to reach SC tissue. | • Quick, firm insertion minimizes discomfort. |
| • Release the skin.                                                                    | • Injecting into compressed tissue irritates nerve fibers. |
| • Rapidly inject the biological product. ①                                             | • Rapid injection reduces pain. |
| • Remove the needle in one swift motion, immediately applying pressure to the injection site with a dry cotton pad/swab/ball.  
• Do not massage the injection site.                                                   | • Minimizes discomfort during needle withdrawal. Alcohol on a cotton pad/swab can irritate non-intact skin.  
• Massage can damage underlying tissue.                                                 |

**NOTE:** Aspiration is not recommended as there are no data to document its necessity prior to the SC injection of biological products.

① Rapid injection is recommended for all vaccines injected subcutaneously or intramuscularly. It is not recommended for more viscous biological products such as immune globulin preparations or those for which the manufacturer recommends a slower administration.
## 11.3 INTRAMUSCULAR (IM) INJECTION ROUTE

<table>
<thead>
<tr>
<th>PROCEDURE (3, 6, 8, 26, 27)</th>
<th>IMPORTANT POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use correct length and size of needle.</td>
<td>• Allow skin to air dry to avoid a burning sensation on insertion of the needle.</td>
</tr>
<tr>
<td>• Clean the site with a cotton pad/swab/ball moistened with 70% isopropyl alcohol.</td>
<td></td>
</tr>
<tr>
<td>• Insert needle quickly at a 90° angle into muscle.</td>
<td></td>
</tr>
<tr>
<td>• If client’s muscle mass is small, grasp body of muscle between thumb and fingers before and during the injection.</td>
<td>• Ensures that biological product reaches the muscle mass.</td>
</tr>
<tr>
<td>• Rapidly inject the biological product 📜</td>
<td>• Rapid injection reduces pain.</td>
</tr>
<tr>
<td>• Remove the needle in one swift motion, immediately applying pressure to the injection site with a dry cotton pad/swab/ball.</td>
<td>• Minimizes discomfort during needle withdrawal. Alcohol on a cotton pad/swab can irritate non-intact skin.</td>
</tr>
<tr>
<td>• Continue to apply pressure for 30 seconds.</td>
<td>• Minimize bruising.</td>
</tr>
<tr>
<td>• Do not massage injection site.</td>
<td>• Massage can damage underlying tissue.</td>
</tr>
</tbody>
</table>

**NOTE:** Aspiration is not recommended as there are no data to document its necessity prior to IM injection of biological products. There are no large blood vessels at the recommended immunization sites. Aspiration may increase the time it takes to immunize and is more painful for the client.

📜 Rapid injection is recommended for all vaccines injected subcutaneously or intramuscularly. It is not recommended for more viscous biological products such as immune globulin preparations or those for which the manufacturer recommends a slower administration.
### 11.4 INTRADERMAL (ID) INJECTION ROUTE

<table>
<thead>
<tr>
<th>PROCEDURE (37)</th>
<th>IMPORTANT POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use correct length and size of needle.</td>
<td>Allow skin to air dry to avoid a burning sensation on insertion of the needle.</td>
</tr>
<tr>
<td>Clean the site with a cotton pad/swab moistened with 70% isopropyl alcohol.</td>
<td></td>
</tr>
<tr>
<td>Gently stretch the skin in the selected region between the thumb and index finger.</td>
<td></td>
</tr>
<tr>
<td>Insert the needle with the bevel facing upwards, at a constant angle of 15° until the bevel disappears.</td>
<td>The needle should be clearly visible beneath the skin.</td>
</tr>
<tr>
<td>Inject the biological product slowly with controlled pressure.</td>
<td>Injection of the solution in the dermis may cause a burning and prickling sensation.</td>
</tr>
<tr>
<td>A white elevated wheal (bleb) 6-8 mm in size should appear.</td>
<td>This indicates the product was not administered intradermally.</td>
</tr>
<tr>
<td>If an elevated wheal does not appear, repeat the procedure, (use the other arm).</td>
<td>Use of dry cotton pad/swab will minimize discomfort associated with alcohol on non-intact skin.</td>
</tr>
<tr>
<td>Remove the needle quickly and sponge the injection point with a dry cotton pad/swab/ball.</td>
<td>A Band-Aid can mark the skin and confuse skin test readings.</td>
</tr>
<tr>
<td>Do not apply a Band-Aid after a TB skin test.</td>
<td></td>
</tr>
</tbody>
</table>
## 11.5 INTRANASAL ROUTE

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>IMPORTANT POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Wash hands or cleanse with sanitizer</td>
<td>• Ensure the lot number on the applicator matches the lot number on the box as the applicator will be discarded immediately after administration.</td>
</tr>
<tr>
<td>• The client should be seated in an upright position with their head tilted back.</td>
<td>• Refer to Section 8: QUADRIVALENT Live Attenuated Influenza Vaccine (LAIV-Q) for more detailed information on administration.</td>
</tr>
<tr>
<td>• Instruct the client to breathe normally, and insert the tip of the nasal sprayer slightly into the nostril (1).</td>
<td></td>
</tr>
</tbody>
</table>

## 11.6 ORAL ROUTE

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>IMPORTANT POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Wash hands or cleanse with sanitizer</td>
<td>• Ensure the lot number on the applicator matches the lot number on the box as the applicator will be discarded immediately after administration.</td>
</tr>
<tr>
<td>• Administer liquid slowly down one side of the cheek (between the cheek and gum) toward the back of the mouth.</td>
<td>• Take care <strong>not</strong> to go far enough to the back of the mouth to initiate the gag reflex.</td>
</tr>
</tbody>
</table>
| • Never administer or spray (squirt) the vaccine into the throat (1). | • Give entire contents of applicator.  
  • If infant spits out or regurgitates any of the vaccine dose, no replacement dose should be administered. |
12.0 CLIENT OBSERVATION FOLLOWING IMMUNIZATION

Advise recipients of any biological product (i.e., vaccine, immune globulin, TB skin test) to remain under supervision for at least 15 minutes after immunization; regardless of whether or not they have had the particular product previously.

Thirty (30) minutes is a safer duration when the person has had a prior allergic reaction to the biological product or a component of the biological product. If an individual has such an allergic history, immunization should occur in an emergency room setting. See Yukon Immunization Program Manual, Section 13 Adverse Events Following Immunization.

The risk of fainting is the more common reason to keep biological product recipients under observation.

In a school-based or mass immunization setting, the clinic site would be the ideal location for client observation. However, it can be problematic in terms of flow of people. Directly observe any client with symptoms such as pallor or sweating (possibly pre-syncope) in the clinic setting. Enable these clients to sit or lie down until symptoms resolve.

Where recipients of a biological product choose not to remain under supervision after immunization, inform them (or their parent/guardian) of the signs and symptoms of anaphylaxis and instruct them to obtain immediate medical attention should symptoms occur.

If a band-aid is applied to an infant or toddler, advise its removal before leaving the clinic. This is to avoid the risk of the child choking on the band-aid.
13.0 MANAGEMENT OF PAIN AND ANXIETY BEFORE AND DURING ADMINISTRATION OF A BIOLOGICAL PRODUCT

Pain associated with immunization is generally described as mild and short lived. However, the need for multiple injections and conflicting information about vaccines in the media has increased public concern and anxiety associated with immunizations. Health care providers must establish an environment that promotes trust and mutual respect.

Refer to subsection 2.3 Client Assessment for techniques to decrease anxiety and the risk of fainting prior to administration of biological products.

As the discomfort associated with immunization is generally mild and transient, it can usually be managed with measures such as those described on the Immunize Canada website - Pain Management During Immunization for Children. Some individuals who are particularly concerned about pain associated with immunization may be interested in the use of topical anesthetics.

13.1 RECOMMENDATIONS FOR A MORE SUCCESSFUL IMMUNIZATION EXPERIENCE

13.1.1 Foster a culture of empathy and respect

Ask about the child’s previous experiences with needles. Individual responses to stress are influenced by temperament, environment and past experience.

Acknowledge the child’s feelings. Give permission to cry.

Do not give false reassurance (i.e., “it won’t hurt”). Honest reassurance is “it may hurt a bit, but I think you can handle it.”

Do not tolerate threats, shaming, or manipulation from the child’s parent/guardian or caregiver. When a parent threatens a child, the most helpful response is to offer empathy to the parent, state a neutral fact or principle and offer hope (e.g., “This must be frustrating for you. Immunizations are never emergencies. I think we can work out something we can all live with”).

Discourage the use of bribes, and encourage effort – no matter how small.

Remain firm as you manage the process. At the same time, show respect for the child.
13.1.2 Structure the environment

If a parent presents with more than one child, immunize the most anxious one first, even if the parent thinks otherwise. The needle is the focus of the child’s fear and watching while someone else is immunized may increase fear and anxiety.

Provide privacy and prepare the immunization ahead, always out of sight of the child. If the child asks to see the needle, explain you will show it after the procedure.

Describe what you plan to do, thereby displaying respect for a child’s right to know, confidence in their ability to manage, and interest in addressing concerns. The child may wonder how long the needle will be in their arm or how quickly it will go in. Threatened loss of control is a factor in needle fear.

Consider the use of practice dolls with children under 6. Offer to immunize a stuffed toy or doll, and invite the child to hold the “patient”. Use a syringe without a needle and go through all the steps, explaining each one as you proceed.

Provide limited, realistic choices and let the child decide (e.g., “Would you like to use your right or left arm?” “Would you prefer to sit or stand?”). Offering realistic choices creates a setting where the child can maintain some personal control and contributes to an atmosphere of mutual respect. Supportive, secure positioning can be achieved with a child (depending upon age) either standing or sitting.

Do not restrain the child before you are ready to administer the vaccine. The longer the child is restrained the greater the loss of personal control and hence increased anxiety. The goal of restraint is not to overpower the child, but to assist the child to remain as still as possible for the procedure.

Manage the time and set limits. If the child cannot calm him or herself, acknowledge their effort and offer a rest period. If there is no other alternative, discuss rescheduling the immunization.

13.1.3 Calming and distraction techniques

Distraction techniques are effective in decreasing pain in infants, toddlers, and children during and following immunization. The child is more involved in the distraction and thus not focused on the pain. Work with the parent to use distraction techniques such as reading, music, use of pinwheels or soap bubbles, and instructing children to “blow the pain away.” Slow, deep breathing has a physiologic calming effect and can, at minimum, limit anxiety escalation. Consider the following techniques to minimize child and parent distress following immunization:

- Suggest swaddling, cuddling and rocking the infant to the parents
- Suggest parents try breastfeeding, bottle-feeding, or using a pacifier, singing a favourite song
### Table 13.2 Overview of Strategies for Diminishing the Unpleasantness of Injections

<table>
<thead>
<tr>
<th>Age</th>
<th>Prior to &amp; during the injection</th>
<th>Following the injection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infant</strong></td>
<td>- Distraction</td>
<td>- Comfort: physical more effective than verbal</td>
</tr>
<tr>
<td></td>
<td>- Adequate restraint</td>
<td>- Breastfeeding</td>
</tr>
<tr>
<td></td>
<td>- Breastfeeding</td>
<td>- Sing a favorite soothing song</td>
</tr>
<tr>
<td><strong>Toddlers</strong></td>
<td>- Explanation: age specific; what you will do, reason for doing</td>
<td>- Reward positive behavior</td>
</tr>
<tr>
<td></td>
<td>- Distraction</td>
<td>- Ignore negative behaviors</td>
</tr>
<tr>
<td></td>
<td>- Parental participation</td>
<td>- Support rituals of comfort</td>
</tr>
<tr>
<td></td>
<td>- Parental involvement</td>
<td>- Use a distracting toy</td>
</tr>
<tr>
<td></td>
<td>- Make choices (i.e. site)</td>
<td>- Allow child to take part (i.e. opening bandages, it is preferable for the parent to apply the bandages)</td>
</tr>
<tr>
<td></td>
<td>- Tell child that this is not punishment</td>
<td></td>
</tr>
<tr>
<td><strong>Preschoolers</strong></td>
<td>- Preparation: what to expect</td>
<td>- Praise: pride in accomplishments</td>
</tr>
<tr>
<td></td>
<td>- Handle equipment: therapeutic play</td>
<td>- Rewards (stickers)</td>
</tr>
<tr>
<td></td>
<td>- Parental involvement</td>
<td>- Comforts (i.e. bandages)</td>
</tr>
<tr>
<td></td>
<td>- Make choices (i.e. site)</td>
<td>- Participation helps a child to cope</td>
</tr>
<tr>
<td></td>
<td>- Tell child that this is not punishment</td>
<td>- Blow bubbles</td>
</tr>
<tr>
<td><strong>School children</strong></td>
<td>- Explanation: talk about feelings (replaces play as a method of dealing with anxiety)</td>
<td>- Praise</td>
</tr>
<tr>
<td></td>
<td>- Handle equipment</td>
<td>- Instruct re: expected reaction</td>
</tr>
<tr>
<td></td>
<td>- Participation i.e. clean site</td>
<td>- Participation supports child's development tasks to master situation</td>
</tr>
<tr>
<td></td>
<td>- Suggest counting, deep breathing to cope with fear</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Given permission to cry if the needle hurts</td>
<td></td>
</tr>
<tr>
<td><strong>Adolescents &amp; adults</strong></td>
<td>- Explain procedure, drug action</td>
<td>- Praise</td>
</tr>
<tr>
<td></td>
<td>- Let express feelings</td>
<td>- Instruct re: expected reaction and care required post injection</td>
</tr>
<tr>
<td></td>
<td>- Privacy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Permit choice of site</td>
<td></td>
</tr>
</tbody>
</table>

14.0 USE OF TOPICAL ANESTHETICS

As the discomfort associated with immunization is generally mild and transient, it can usually be managed with measures such as those described on the Immunize Canada website- Pain Management During Immunization for Children. Some individuals who are particularly concerned about pain associated with immunization may be interested in the use of topical anesthetics.

Provide information to adults and caregivers of infants and children about the use of topical anesthetics (1, 2). Suggest parents combine topical anesthetics before immunization with breastfeeding during vaccine injections for infants and children ≤ 2 years of age.

There are several topical anesthetic products available for purchase.

- Lidocaine/prilocaine (e.g., EMLA® is a eutectic mixture of 2.5% lidocaine and 2.5% prilocaine and is available as a cream or patch)
- Tetracaine (e.g., Ametop™ gel is 4% tetracaine)
- Lidocaine (e.g., Maxilene 4™ or Maxilene 5™ cream contain 4% and 5% lidocaine respectively)

Advise clients to apply the topical anesthetic according to the manufacturer’s instructions found on the product label or the product insert. After application, it is advisable to use a pen to trace the edges of the product. This will let the immunizer see where the product was applied.

Whenever a topical anesthetic is applied, it must be removed before proceeding with the immunization. For more detailed information on use, refer to Table 1: Summary of Considerations for Use of Topical Anesthetics.

Topical anesthetics have been found to cause transient local skin reactions (e.g., pallor and/or erythema). The presence of a transient local skin reaction does not affect the effectiveness of the topical anesthetic. Discuss this possibility to assist clients and parents in distinguishing between this reaction and a local reaction to the vaccine. For more information regarding the use of topical anesthetics in children, refer parents to HealthLink BC: Numbing Creams and Patches for Immunizations.

Research has shown that parents are able to apply topical anesthetics correctly when trained to do so and would pay the additional cost of the agents to reduce their child’s pain.
14.1 RATIONALE FOR USE OF TOPICAL ANESTHETICS:

- There is strong evidence supporting the effectiveness of topical anesthetics in preventing pain in individuals ≤ 12 years of age (1, 24-28).
- There is moderate evidence supporting their use in individuals > 12 years of age.
- Topical anesthetics are safe and effective for infants and children.

Studies have demonstrated that topical anesthetics do not interfere with the immune response to several vaccines [i.e., DTaP-IPV-Hib (Pentacel®), hepatitis B (Recombivax®) and MMR (MMR II®)] (27,28). Considering this body of research, there is no reason to suspect there would be a risk of decreased immune response to other vaccines.

Topical anesthetics act by inhibiting the generation and transmission of pain impulses across nerve endings located in the dermis. They decrease the pain as the needle penetrates the skin and reduce the underlying muscle spasm associated with this pain. Given that there is a cumulative effect when infants or children are exposed to sequential painful stimuli, prevention of the initial painful stimulus (needle puncture through the skin) decreases the overall pain experience.

Topical anesthetics have been well-studied and found to be effective in reducing vaccine injection pain in infants and children.

14.2 CONSIDERATIONS FOR USE OF TOPICAL ANESTHETICS:

Topical anesthetics may be more effective in some individuals than others. Factors that may influence effectiveness include the level of anxiety, age, temperament, and genetic variability.

The inappropriate use of topical anesthetics (e.g., applying more than the recommended amount, leaving the product in place for longer than the recommended time, or applying the product to non-intact skin) can lead to serious side effects such as methemoglobinemia, seizures, irregular heartbeat and difficulty breathing. Very rarely, these reactions have occurred even after correct application of these products. Neonates are at increased risk of methemoglobinemia.
<table>
<thead>
<tr>
<th>Topical Anesthetic</th>
<th>Considerations</th>
</tr>
</thead>
</table>
| EMLA® (2.5% lidocaine and 2.5% prilocaine) cream or patch | • Should be applied at least 60 minutes before immunization. Local analgesia is achieved after a 60-minute application under occlusive dressing.  
• EMLA® cream should be covered with occlusive dressing.  
• Depth of analgesia is 3 mm after 1 hour of application.  
• Local analgesia persists for at least 2 hours after removal of cream.  
• Neonates are at increased risk of methemoglobinemia as a result of exposure to prilocaine. Methemoglobinemia is a clinical condition in which more than 1% of hemoglobin in blood has been oxidized to the ferric form. The principal sign is cyanosis because the oxidized hemoglobin is incapable of transporting oxygen. Studies have found that the risk of methemoglobinemia is low in infants exposed to recommended dosages of prilocaine. In full term neonates, single doses ranging from 0.5 to 2 grams applied for 30 to 180 minutes have not been reported to cause methemoglobinemia (29, 30).  
• Children should be monitored during product use.  
• Safety of EMLA® during pregnancy hasn’t been established.  
• **Contraindicated for:**  
  o Individuals who are sensitive to local anesthetics of the amide type or to any ingredient of EMLA®  
  o Individuals with congenital or idiopathic methemoglobinemia  
  o Infants ≤ 12 months of age who require treatment with methemoglobin-inducing agents (e.g., sulphonamides)  
  o Preterm infants (i.e., < 37 weeks gestational age)  
  o Care should be used when applying EMLA® to individuals with atopic dermatitis (eczema) or other skin conditions. A more rapid and greater absorption through the skin may occur. A shorter application time should be used. |
| Ametop™ gel (4% tetracaine) | • Should be applied 30-45 minutes before immunization.  
• Local analgesia persists for 4-6 hours.  
• **Contraindicated for:**  
  o Infants < 1 month of age and premature infants  
  o Individuals who are allergic to local anesthetics of the ester type  
  o Do not use on broken skin. |
Maxilene cream
(available in 4% and 5% lidocaine)

<table>
<thead>
<tr>
<th>Should be applied 30-60 minutes before immunization.</th>
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<tr>
<td>It is recommended that the cream be covered with an occlusive substance (e.g., clear, plastic wrap) to prevent children from ingesting it orally.</td>
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<tr>
<td>Consult a physician regarding use in children &lt; 2 years of age.</td>
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Vapocoolants are only recommended for individuals 18 years of age or older. Vapocoolants are applied topically to the immunization site immediately before injection. There is a rapid cooling effect on the skin which has been shown to reduce immunization injection pain. The effect dissipates within 1 minute of application.
15.0 MANAGEMENT OF FEVER AND PAIN FOLLOWING IMMUNIZATION

Inform client (or parent / guardian) about expected reactions to each biological product administered. Advise parents that child may experience fever, injection site pain and cry or be fussy following immunization. For the alleviation of fever and pain, suggest parents:

- Apply a clean, cool wet washcloth for 15 to 20 minutes over the immunization site(s)
- See Overview of Strategies for Diminishing the Unpleasantness of Injections
- Give acetaminophen (see 13.1 Fever management for appropriate dosages)

Instruct client (or parent / guardian) to contact health care provider if concerned about reaction or about any adverse event that occurs following receipt of the biological product. See Yukon Immunization Program Manual, Section 13, Adverse Events Following Immunization for more information regarding adverse events.

Local and systemic reactions may follow use of biological products. Common reactions to biological products are usually mild, self-limited, and without permanent sequelae. They are intrinsic to the immunizing antigen or some component of the biological product. These reactions can safely be managed with symptomatic treatment.

Local reactions include pain, redness and swelling at the injection site. These reactions tend to occur within a few hours of the injection, and are common with inactivated vaccines that contain adjuvants (e.g., DTaP/IPV/Hib). Crying and irritability in infants and young children are likely responses to pain at the site of injection.

The body's response to injected proteins can also affect heat regulation and produce fever within a few hours of vaccination.

Systemic reactions are more generalized events and include fever, rash, malaise, myalgia, and headache. These reactions are more common following the administration of live attenuated vaccines (e.g., measles, mumps and rubella vaccines) that must replicate in order to produce immunity. The systemic reactions represent symptoms produced from that replication, and are similar to a mild form of the natural disease.

When the immunizing agent is a live attenuated vaccine, inform parents that systemic adverse events tend to occur later than those following the administration of inactivated vaccines. For example, for a measles-mumps-rubella-containing vaccine, fever may occur 5 - 30 days after vaccination, most commonly within 7 - 14 days. With a varicella vaccine, fever may occur within 0 - 42 days, most commonly between 14 and 27 days after immunization.
15.1 FEVER MANAGEMENT

When fever is suspected, it is preferable to use a thermometer to measure temperature accurately (38).

If parents choose to administer medication for use in managing fever and pain, acetaminophen should be recommended. Its use is preferred to that of ibuprofen. Acetaminophen has an overall safer drug interaction and precaution profile as compared to ibuprofen.

Acetylsalicylic acid (ASA) is not recommended for children because of its associated risk of Reye syndrome.

It appears unlikely that a serious risk such as the link between ASA and Reye syndrome will surface for acetaminophen. However, the same cannot yet be said with an equivalent degree of certainty for ibuprofen. Until adverse event data collected over a period of years prove conclusively that rare serious events are not associated with ibuprofen, acetaminophen must remain the drug of first choice. While likely to be safe and efficacious, ibuprofen should be reserved for second-line therapy, and then used on an episode by episode basis on the advice of a primary health care provider.

Prior to the introduction of acellular pertussis in Canada in 1997, there was limited data to support the use of anti-pyretic administration at the time of vaccination to decrease the incidence of post vaccination fever, attributed to DTP immunization. Since the introduction of acellular pertussis, prophylaxis administration of acetaminophen or ibuprofen is not recommended.

Acetaminophen may be given as per manufacturer’s instruction, four to five times daily, not to exceed five doses in 24 hours (39). Advise parents not to continue use beyond 48 hours unless specified to do so by their health care provider. Advise parents to initiate this dosage regimen when there are symptoms of fever and/or pain shortly after immunization.

There are no supporting clinical studies for the prophylactic use of acetaminophen in children prone to febrile seizures. In fact, prophylaxis in high risk children has been shown to be ineffective (40).

Acetaminophen and Ibuprofen are to be used as per manufacturer instructions or the advice of a health care provider. Advise parents to read the label on the product they are using and be aware of the concentration of medication.

As per manufacturers directions for products or the advice of your health care provider.
16.0 DOCUMENTATION

Promptly record the administration of all biological products using the documentation system in Panorama. Panorama is the legal record for all immunizations given in Yukon.

Only the parent / guardian paper consent is maintained in the paper file, re-documentation of the immunizations given is not required in the paper file, instead the provider may state, "see Panorama for immunizations given". See Yukon Immunization Program, Section 9, Documentation Standards.

For each biological product administered the minimum data to be recorded in the client's Panorama record should include:

- name of the biological product
- date
- route of administration
- anatomical site
- name of the biological product manufacturer
- lot number
- dose
- name and title of the person administering the biological product
- any reactions following immunization.
- any recommended biological products that were not given (i.e., declined, deferred, or contraindicated)
- informed consent

The paper copy of the informed consent for immunization obtained as apart of the school based programs or initiation of the primary immunization series is placed on the client's paper record. (see Yukon Immunization Program Manual, Section 2, Informed Consent).
17.0 REFERENCES


