

SECTION 12 - ANAPHYLAXIS

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1.0 ANAPHYLAXIS

1.1 DESCRIPTION

Anaphylaxis is a potentially life-threatening IgE-mediated reaction that results from the sudden systemic release of allergenic mediators (e.g., histamine, leukotrienes, prostaglandins, tryptase) from mast cells and basophils. Within 10 minutes, increased vascular permeability allows transfer of as much as 50% of the intravascular fluid into the extravascular space. As a result, hemodynamic collapse might occur rapidly with little or no cutaneous or respiratory manifestations.

While anaphylaxis is extremely rare, every immunization carries an associated risk of producing an anaphylactic reaction. The estimated annual reported rate of anaphylaxis ranges from 0.4 to 1.8 reports per 1,000,000 doses of vaccines distributed in Canada.

In general, the sooner the onset, the more rapid and severe the anaphylactic reaction.

Anaphylaxis often produces signs and symptoms within minutes of exposure to an offending stimulus. Most instances begin within 30 minutes after an injection of vaccine, but some reactions might develop later.

As 20% of anaphylaxis episodes follow a biphasic course with recurrence of the reaction after a 2 to 9 hour asymptomatic period, hospitalization or a long period of observation is recommended for monitoring. The presentation of the second phasic reaction may be as pronounced as that of the initial anaphylactic episode.

1.2 PRESENTATION

Changes develop over several minutes and usually involve at least two body systems (affecting the skin, respiration, circulation). Unconsciousness is rarely the sole manifestation of anaphylaxis and occurs only as a late event in severe cases.

Anaphylaxis occurs as part of a continuum. Even when there are mild symptoms initially there is the potential for progression to a severe and even irreversible outcome.

Fatalities during anaphylaxis usually result from delayed administration of epinephrine and from severe respiratory complications, cardiovascular complications, or both. There is no contraindication to epinephrine administration in anaphylaxis.

See Table 1: For Frequency of Occurrence of Signs and Symptoms of Anaphylaxis.

Table 1: Frequency of occurrence of signs and symptoms of anaphylaxis	
Signs and symptoms	Approximate frequency
Cutaneous	90%
• Generalized urticaria (hives)and/or angioedema (welts)	85 – 90%
• Flushing	45 – 55%
• Pruritus (itchiness) with or without rash	2 – 5%
Respiratory	40 – 60 %
• Upper airway angioedema	50 – 60%
• Dyspnea (difficulty breathing), wheeze	45 – 50%
• Rhinitis (nasal congestion)	15 – 20%
Dizziness, syncope (fainting), hypotension	30 – 35%
Abdominal	
• Nausea, vomiting, diarrhea, cramping pain	25 – 30%
Miscellaneous	
• Headache	5 – 8%
• Substernal (chest) pain	4 – 6%
• Seizure	1- 2%
From: The diagnosis and management of anaphylaxis: an updated parameter. (2005). <i>Journal of Allergy and Clinical Immunology</i> , 115, S483-523.	

1.3 ASSESSMENT

Assess:

- Level of consciousness (impairment might reflect hypoxia)
- Upper and lower airways [observe for hoarse cry/voice, stridor (a high-pitched noisy sound occurring during inhalation or exhalation), cough, wheezing, or shortness of breath]
- Respiratory rate
- Pulse rate (assess for rapid, weak pulse). Examine for pallor or cyanosis around perioral area
- Skin (observe for facial flushing, itching, hives or welts)
- Gastrointestinal system (nausea, vomiting, or diarrhea)
- Injection site(s). Observe for redness, swelling, or hives.

Record full details of the assessment. The “Worksheet for Emergency Treatment of Anaphylaxis” may be used to record the signs and symptoms. See SECTION [9.0 WORKSHEET FOR EMERGENCY TREATMENT OF ANAPHYLAXIS](#)

1.4 ACTION OF EPINEPHRINE

Action of epinephrine:

- Counteracts the histamine-induced vasodilation
- Increases heart rate and cardiac contractility to increase oxygenated blood flow to vital organs
- Acts on smooth muscles of bronchial tree thereby reducing bronchospasm
- Suppresses body's immune response (slows down histamine cascade).

Intramuscular (IM) epinephrine injections into the thigh (vastus lateralis) have been reported to provide more rapid absorption and higher plasma epinephrine levels in both children and adults than Intramuscular or subcutaneous injections administered into the arm. Therefore, intramuscular is the preferred route for the administration of epinephrine and the thigh is the preferred site for its administration.

When epinephrine is administered (IM), it acts on beta adrenergic receptors found in the skeletal muscle vasculature causing vasodilation. Thus, when IM immunization is given and epinephrine is indicated, it should not be administered into the same muscle mass as the vaccine was administered. The epinephrine will produce vasodilation locally at the site, increase vascular permeability, and may increase absorption of the offending antigen.

Side effects of excessive doses of epinephrine pose little danger but can add to the person's distress by causing palpitations, tachycardia, flushing, and headache. Cardiac dysrhythmias can occur in older adults but are rare in otherwise healthy children.

2.0 ANAPHYLAXIS VERSUS FAINTING, ANXIETY, ALLERGIC REACTION, OR INJECTION SITE REACTION

Anaphylaxis must be distinguished from fainting (vasovagal syncope), anxiety, and breath-holding spells which are more common and benign reactions. The lack of hives, a slow, steady pulse rate, and cool pale skin distinguishes a vasovagal episode from anaphylaxis.

2.1 FAINTING

During fainting, the individual suddenly becomes pale, loses consciousness and collapses to the ground. Fainting is sometimes accompanied by brief clonic seizure activity (i.e., rhythmic jerking of the limbs), but this generally requires no specific treatment or investigation.

Recovery of consciousness occurs within a minute or two, but clients may remain pale, diaphoretic and mildly hypotensive for several more minutes. **If unconsciousness persists for more than 2-3 minutes, call 911/ambulance and proceed as per emergency treatment for anaphylaxis.** Unconsciousness may reflect hypoxia.

Prior to immunization, ask client about history of fainting with previous immunizations.

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

- 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 vaccine(s) out of view of recipients
- Provide privacy during vaccination
- If client is anxious and pale: have them lie down with legs elevated, reassure, and apply cold wet cloth to face.
- If person was lying down, have them sit for a few minutes before standing.

2.2 ANXIETY/PAIN REACTION

People experiencing an anxiety reaction may appear fearful, pale and diaphoretic and complain of lightheadedness, dizziness and numbness, as well as tingling of the face and extremities. Hyperventilation is usually evident.

If an individual appears anxious, it may be helpful to have them rebreathe into a paper bag until symptoms subside.

Breath-holding spells occur in some young children when they are upset, crying hard, and reacting to injection pain. The child is suddenly silent but obviously agitated. Facial flushing and perioral cyanosis deepens as breath-holding continues. Some spells end with resumption of crying, but others end with a brief period of unconsciousness during which breathing resumes. Occasionally, the breath holding spell may be accompanied by brief clonic seizure activity. Similar spells may have been observed in other circumstances. No treatment is required beyond reassurance of the child and parents.

Section 2.3, Outlines the key differences between anaphylaxis, fainting, and an anxiety reaction.

2.3 ANAPHYLAXIS VERSUS FAINTING AND ANXIETY

	ANAPHYLAXIS	FAINTING	ANXIETY
DEFINITION	An acute systemic and potentially fatal allergic reaction to a foreign substance. IgE-mediated antibody induces histamine release from tissue mast cells.	A temporary unconsciousness caused by diminished blood supply to the brain due to painful stimuli or emotional reaction.	A protective physiological state recognized as fear, apprehension, or worry.
ONSET	Usually slower, most instances begin within 30 minutes after immunization.	Sudden, occurs before, during, or shortly after immunization; recovery occurs within 1-2 minutes	Sudden, occurs before, during, or shortly after immunization; recovery occurs within 1-2 minutes
SKIN	<ul style="list-style-type: none"> - flushed, red blotchy areas (not necessarily itchy) - itchy, generalized hive-like rash - tingling sensation often first felt about the face and mouth - progressive, painless swelling about the face, mouth, & tongue 	<ul style="list-style-type: none"> - pale - excessive perspiration - cold, clammy 	<ul style="list-style-type: none"> - pale - excessive perspiration - cold, clammy
BREATHING	<ul style="list-style-type: none"> - sneezing, coughing, wheezing, laboured breathing - upper airway swelling (indicated by hoarseness and/or difficulty swallowing) possibly causing airway obstruction 	<ul style="list-style-type: none"> - normal or shallow, irregular, laboured 	<ul style="list-style-type: none"> - rapid and shallow (hyperventilation)
PULSE	<ul style="list-style-type: none"> - rapid, weak 	<ul style="list-style-type: none"> - slow, steady 	<ul style="list-style-type: none"> - rapid
BLOOD PRESSURE	<ul style="list-style-type: none"> - decreased systolic and diastolic 	<ul style="list-style-type: none"> - decreased systolic and diastolic 	<ul style="list-style-type: none"> - normal or elevated systolic
SYMPTOMS & BEHAVIOR	<ul style="list-style-type: none"> - uneasiness, restlessness, agitation - hypotension, which generally develops later and can progress to cause shock and collapse - not all signs/symptoms will be exhibited in each person; usually one body system predominates. 	<ul style="list-style-type: none"> - fearfulness - light-headedness - dizziness - numbness, weakness - sometimes accompanied by brief clonic seizure activity 	<ul style="list-style-type: none"> - fearfulness - light-headedness - dizziness, numbness, weakness - tingling around lips and spasm in the hands and feet associated with hyperventilation - hyperventilation
GASTRO-INTESTINAL	<ul style="list-style-type: none"> - nausea and vomiting - abdominal pain, diarrhea 	<ul style="list-style-type: none"> - nausea 	<ul style="list-style-type: none"> - nausea
OTHER SYMPTOMS	<ul style="list-style-type: none"> - loss of consciousness - progression of injection site reaction beyond hives & swelling 		

2.4 ALLERGIC REACTION

Allergic reactions constitute a spectrum, the extreme end of which is anaphylaxis, but milder forms may involve both the dermatologic/mucosal (e.g., urticaria, pruritis, rhinitis) and/or the respiratory systems (e.g., upper airway swelling, respiratory distress). Anaphylaxis is set apart from simple allergic reactions by the simultaneous involvement of the cardiovascular system and loss of intravascular volume, as well as respiratory obstruction.

2.5 INJECTION SITE REACTIONS

A mild local reaction resolving by itself within a few minutes does not require special observation.

If swelling and hives occur at the injection site(s):

- Keep client under **direct observation** for at least 30 minutes to ensure the reaction remains localized
- Observe for any deterioration in condition
- If hives or swelling disappears, or there is no evidence of any progression to other parts of the body or any other symptoms within the 30-minute observation period, no further observation is necessary. Release the client from observation.
- **If any other symptoms arise**, even if considered mild (e.g., sneezing, nasal congestion, tearing, coughing, facial flushing) or if there is evidence of any progression of the hives or swelling to other parts of the body, **administer epinephrine**
- There is little risk to the unnecessary use of epinephrine, whereas delay in its administration (when required) may result in difficulty to treat anaphylaxis and in death
- Apply ice for comfort.

3.0 MONITOR POST-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.

The risk of fainting is the more common reason to keep vaccinees under observation. Routine supervision should ensure that vaccinees remain within a short distance of the vaccinator with the instruction that they ask someone to obtain the nurse for them immediately for assessment if they feel unwell.

Where vaccinees choose not to remain under supervision after immunization, they (or their parent/guardian) should be informed of the signs and symptoms of anaphylaxis and instructed to obtain immediate medical attention should symptoms occur.

4.0 CLIENT TRANSPORT IN NON-TREATMENT SETTINGS

Arrange for rapid transport by emergency vehicle to an emergency department. Since 20% of anaphylaxis episodes follow a biphasic course with recurrence of the reaction after a 2 – 9 hour asymptomatic period, hospitalization or a long period of observation is recommended for monitoring.

5.0 RECORD

- Record full details of the assessment. The “Worksheet for Emergency Treatment of Anaphylaxis” may be used to record the signs and symptoms. See [SECTION 9.0 WORKSHEET FOR EMERGENCY TREATMENT OF ANAPHYLAXIS](#)
- For complete direction on Anaphylaxis documentation see [Yukon Immunization Program Section 13-Adverse Events Following Immunization](#).

6.0 MAINTENANCE OF EPINEPHRINE VIALS AND OTHER EMERGENCY SUPPLIES

- Check epinephrine vials and other emergency supplies prior to each immunization clinic and monthly. Replace drugs if outdated and supplies as needed.
- Protect epinephrine and diphenhydramine hydrochloride from light and open vial(s) only when ready to use.
- Do not pre-load a syringe with epinephrine in anticipation of a reaction. Epinephrine rapidly deteriorates and loses potency when exposed to oxygen.

6.1 EMERGENCY SUPPLIES

epinephrine kit contents:

- Copy of anaphylaxis procedures including dosing for epinephrine and diphenhydramine.
- 2 - 1 cc syringes and needles (25 – 27 gauge, 1" needle)
- 1 - 1cc syringe and needle (25 – 27 gauge, 1 ½" needle)
- 2 - 3 cc syringes and needles (25 – 27 gauge, 1" and 1 ½" needles)

- 2 – 1cc syringes and needles (25 – 27 gauge, 5/8”) for SC route
- extra needles
- 2 ampules of epinephrine 1:1,000 (within expiration time frame)
- 2 vials of diphenhydramine hydrochloride 50mg/ml (within expiration time frame)
- diphenhydramine po (liquid)
- alcohol swabs
- pens/paper

7.0 EMERGENCY TREATMENT OF ANAPHYLAXIS-NON TREATMENT FACILITY

(Whitehorse Health Centre, Watson Lake Health Centre, KDFN, YCDC, & satellite clinics)

IMMEDIATELY

- **Promptly administer EPINEPHRINE (1:1,000) IM** into an unimmunized thigh.
- Call for help either 9-1-1 or local number for Ambulance
- If both thighs were used for immunization:
 - give epinephrine **IM** into deltoid if client is \geq 12 months old
 - give epinephrine **SC** into upper outer triceps area of the arm(s) if client is $<$ 12 months old
- If both thighs and both arms were used for IM immunizations, give epinephrine **SC** into upper outer triceps area of the arm(s) or into the fatty area of the anterolateral thigh.
- **DO NOT** give epinephrine into the same muscle mass as vaccine was given.

Dose: 0.01ml/kg to maximum of 0.5ml OR:	
AGE	EPINEPHRINE
2 – 6 months	0.07 ml
7 – 12 months	0.10 ml
13 months – 4 years	0.15 ml
5 years	0.20 ml
6 – 9 years	0.30 ml
10 – 13 years	0.40 ml
\geq 14 years	0.50 ml

****Repeat epinephrine twice at 5 minute intervals, as needed (max. 3 doses) Alternate right and left thigh or arm sites for repeat doses of epinephrine**

- Position client in recumbent position and elevate legs, as tolerated symptomatically
- Establish oral airway if necessary
- Administer High Flow Oxygen , 10L/minute
- Monitor vital signs including B/P, respiratory rate & effort, pulse & SP0₂

***Diphenhydramine hydrochloride is considered second-line therapy to epinephrine and should never be administered alone in the treatment of anaphylaxis.**

IF SYMPTOMS ARE NOT CONTROLLED or TO MAINTAIN SYMPTOM CONTROL IF CLIENT CANNOT BE TRANSFERRED TO ACUTE CARE FACILITY WITHIN 30 MINUTES

- Give **one dose** of Diphenhydramine hydrochloride 50 mg/ml IM **preferably** at a different site to that in which epinephrine was given. If necessary, use same thigh as the one in which epinephrine was given. Can also be given into same muscle mass as vaccine was given.
- Can give at any time interval, either after the initial or repeat doses of epinephrine.

AGE	Diphenhydramine Hydrochloride	Oral or Injected
< 2 years	0.25 ml	(12.5 mg)
2 – 4 years	0.50 ml	(25mg)
5 – 11 years	0.50-1.00ml	(25-50mg)
\geq 12	1.00ml	(50mg)

8.0 TREATMENT OF ANAPHYLAXIS - COMMUNITY HEALTH FACILITIES- TREATMENT

PATIENTS PRESENTS WITH SEVERE ALLERGIC REACTION

REMEMBER: alternate presentations i.e. abdominal pain, nausea, vomiting, and paresthia, altered mental state such as anxiety, agitation, and stupor.

If reaction is secondary to a vaccination, administer epinephrine **preferably IM in an un-immunized thigh; if not possible at least one inch from vaccination site or administer SC in a non-vaccinated limb.

PROMPTLY ADMINISTER: Epinephrine 1 mg/ml (1:1000) IM is preferred route
(Mid anterolateral thigh) (Repeat at 5–15 minute intervals, max 3 doses without physician order, depending on the severity of the reaction.)

PEDIATRIC: 0.01 ml/kg IM (max. 0.5 ml) - If weight is NOT known, refer to age/dose chart
ADULT: 0.2 - 0.5 ml IM (max .5 ml) (Note 0.01 ml=0.01 mg so 0.2 to 0.5 ml =0.2 to 0.5 mg)

Epi is the priority

These additional steps (*) are being done simultaneously, or as rapidly as possible

* Call for assistance- second nurse, clerk, local EMS

*Place Client in recumbent position

*Establish oral airway if necessary. Monitor airway

*Administer high flow oxygen, 10L/minute NRM

Establish IV- Normal Saline (preference is 2 large bore IV sites)

Monitor vital signs- B/P, P, RR, SP0₂, cardiac monitor

Consult physician, Call EMS for medevac arrangements as required

Discuss with physician pharmacological adjuncts:

1. **Diphenhydramine:** (Benadryl)- 1 mg/kg IV up to 50 mg
 - po for conscious patients if IV route not available
 - IM route for unconscious patients if IV route not available
2. **Ranitidine:** 1mg/kg up to 50 mg IV/IM for children; 50 mg IV/IM adults
3. **Hydrocortisone sodium succinate:**
 - PEDIATRIC: 5 mg/kg IV bolus (max 250 mg)
 - ADULT: 500 mg IV bolus
4. **Salbutamol nebulized:** if bronchospasm is occurring
5. **Glucagon:** 0.5- 1 mg IV if on β -Blocker
6. **Norepinephrine:** if vasopressor required- advise Medevac team to bring

MEDEVAC TO WGH FOR CONTINUED OBSERVATION

Rationale: Risk of rebound response

9.0 WORKSHEET FOR EMERGENCY TREATMENT OF ANAPHYLAXIS

Client Name: _____ PHN: _____ Surname/Given Name Parent/Guardian: _____ Birthdate: _____ Telephone: _____ (____) _____ yyyy/mm/dd																									
Immunization(s) given: 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ Date: _____ (yyyy/mm/dd) Approx. Time Given: _____ Onset of Reaction: _____	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:15%;">Dose:</th> <th style="width:15%;">Route:</th> <th style="width:15%;">Site:</th> <th style="width:55%;">Signature of provider:</th> </tr> </thead> <tbody> <tr> <td>1 _____</td> <td>1 _____</td> <td>1 _____</td> <td>1 _____</td> </tr> <tr> <td>2 _____</td> <td>2 _____</td> <td>2 _____</td> <td>2 _____</td> </tr> <tr> <td>3 _____</td> <td>3 _____</td> <td>3 _____</td> <td>3 _____</td> </tr> <tr> <td>4 _____</td> <td>4 _____</td> <td>4 _____</td> <td>4 _____</td> </tr> <tr> <td>5 _____</td> <td>5 _____</td> <td>5 _____</td> <td>5 _____</td> </tr> </tbody> </table> <p>Details of Reaction (record in Adverse Events comments field in iPHIS)</p> <input type="checkbox"/> decreased level of consciousness <input type="checkbox"/> hives: <input type="checkbox"/> generalized or <input type="checkbox"/> localized at injection site / <input type="checkbox"/> welts <input type="checkbox"/> flushing <input type="checkbox"/> itchiness: <input type="checkbox"/> with rash or <input type="checkbox"/> without rash / <input type="checkbox"/> red and itchy eyes <input type="checkbox"/> wheeze <input type="checkbox"/> rapid respiratory rate <input type="checkbox"/> difficulty breathing <input type="checkbox"/> hoarse voice <input type="checkbox"/> sensation of throat closure <input type="checkbox"/> cyanosis <input type="checkbox"/> grunting <input type="checkbox"/> upper airway swelling (lip, tongue, etc.) / dry cough <input type="checkbox"/> tearing <input type="checkbox"/> sneezing <input type="checkbox"/> runny nose <input type="checkbox"/> ↑ use of accessory respiratory muscles <input type="checkbox"/> tingling or prickle sensation: <input type="checkbox"/> generalized or <input type="checkbox"/> around the mouth or in hands/feet <input type="checkbox"/> nausea <input type="checkbox"/> vomiting <input type="checkbox"/> diarrhea <input type="checkbox"/> abdominal pain <input type="checkbox"/> dizziness <input type="checkbox"/> syncope <input type="checkbox"/> swelling at injection site(s) <input type="checkbox"/> OTHER (describe): _____	Dose:	Route:	Site:	Signature of provider:	1 _____	1 _____	1 _____	1 _____	2 _____	2 _____	2 _____	2 _____	3 _____	3 _____	3 _____	3 _____	4 _____	4 _____	4 _____	4 _____	5 _____	5 _____	5 _____	5 _____
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Pulse _____ Resp _____ Diphenhydramine hydrochloride Time: Lot #	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:15%;">Dose:</th> <th style="width:15%;">Route:</th> <th style="width:15%;">Site:</th> <th style="width:55%;">Signature of provider:</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Dose:	Route:	Site:	Signature of provider:																				
Dose:	Route:	Site:	Signature of provider:																						
Attended by paramedics: <input type="checkbox"/> y <input type="checkbox"/> n Transfer to hosp: <input type="checkbox"/> y <input type="checkbox"/> n Time of transfer to hosp: _____ Released to care of family: <input type="checkbox"/> y <input type="checkbox"/> n Released to care of GP: <input type="checkbox"/> y <input type="checkbox"/> n																									
Name(s) of Recorder(s): _____ Signature(s): _____ _____ Date: _____ yyyy/mm/dd																									

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