



College of Licensed
Practical Nurses of Alberta

Anaphylaxis
Learning Module
FOR LICENSED PRACTICAL NURSES

February 2005

Adapted from: The College of Licensed Practical Nurses of Alberta Immunization Certificate Course for Licensed Practical Nurses (2002) with input from community health specialists from Capital Health and David Thompson Health Region.

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Module Description & Purpose

Many Licensed Practical Nurses (LPNs) are now practicing medication administration in non-hospital environments where they may be expected to manage anaphylaxis (i.e., schools, clinics, home care). This module is designed to assist the LPN to understand how to manage anaphylaxis in non-hospital environments. The information in this module is enriched by the knowledge, skill, attitudes and judgment the LPN already has acquired through the study of anaphylaxis, pharmacology, and medication administration, including the skills of intramuscular, intradermal, and subcutaneous injections and infusion therapy.

This learning module is intended for practicing LPNs who have completed education in subcutaneous and intramuscular injections.

Objectives of the Module

At the completion of the Anaphylaxis Module the Licensed Practical Nurse will:

- Have the knowledge and ability to recognize and manage anaphylaxis:
 - identify symptoms of anaphylaxis
 - administer anaphylactic medications as appropriate
 - manage anaphylaxis in a variety of environments.

Module Requirements

To complete this module, the learner will:

1. Study the module information.
2. Complete the exercises at the end of the module.
3. Record the learning in CCP Binder-Record of Professional Activity.

Anaphylaxis Learning Module

Overview

This module reviews and reinforces the concepts of identifying and managing anaphylaxis. The LPN applies knowledge of pharmacology and the principles of medication administration to the skill of medication administration. As in all nursing skills, the LPN must be competent and proficient in the procedure to protect the client and to prevent untoward effects.

Module Objectives

To complete this Module , the LPN will:

1. Examine the common responses to medications.
2. Identify common allergens.
3. Assess for cardinal signs and symptoms of anaphylaxis.
4. Manage anaphylaxis in a variety of settings.
5. Document and report following an allergic reaction incident.

Objective 1- Responses to a Medication

Anaphylactic reaction is a life-threatening serious allergic reaction to an allergen. Although anaphylaxis is uncommon, if not treated appropriately, it may cause death.

When administering a medication it is important to recognize and differentiate between allergic reactions and the potentially life threatening anaphylactic reactions immediately. It is also essential to determine whether the individual has had an allergic or anaphylactic response to the medication in the past, prior to administration.

Desired Effect

- The desired effect is the achievement of the therapeutic goal of the drug. The drug literally does what it is supposed to do.

Side Effect

- A side effect is a mild but annoying response to a medication.

Adverse Effect

- An adverse effect is a more severe symptom or problem caused by the medication.

Idiosyncratic Response

- An idiosyncratic response is a unique, strange, or unpredictable response.

Paradoxic Reaction

- A paradoxic reaction is a reaction that is opposite of the expected or desired effect.

Allergic Response / Reaction

- An allergic reaction is an antigen – antibody reaction which usually occurs when an individual has had prior exposure to the antigen and has developed antibodies to it. Upon re-exposure the antigen – antibody reaction causes a rash, hives, itching, and / or swelling. Shortness of breath may be experienced as well.

Anaphylactic Response / Reaction

- Anaphylaxis refers to a severe allergic reaction in which prominent dermal and systemic signs and symptoms manifest. Anaphylaxis is life threatening and must be treated in a timely manner.

Objective 2-Common Allergens

In Canada, 1-2 percent of the population lives with the risk of anaphylactic reaction and more than ½ of all Canadians know of someone who has a severe life-threatening allergy.

The most common allergen to cause allergic reaction is food. According to the Anaphylaxis Canada website (www.anaphylaxis.org); peanuts, tree nuts, fish, and seafood is most common for adults, and milk, eggs, peanut, soy, tree nuts fish, and seafood are most common in children. Medications, especially penicillin, are considered the second most common allergens. Insect venom, latex, and physical factors are also relatively common.

Radiological contrast media and blood and blood products are also potential substances that can cause severe anaphylaxis. Although these substances are currently only given in controlled environments like hospitals and clinics it is important for the nursing staff to be aware of anaphylaxis risks.

Usually anaphylaxis is diagnosed in childhood. However, it can also develop later in a person's life. People who have experienced anaphylaxis must always be prepared for the risk of another unsuspected reaction. They must learn to avoid the allergen throughout their daily lives. This of course is more difficult with food or insect allergies than with drug allergies; however patients who have a severe allergy should be advised to wear or carry a Medic Alert ® bracelet or card.

Prior to administering a medication, it is essential that the LPN assess the client's allergy history and whether the client has ever had an adverse / allergic reaction to a previous dose. It is important to determine if the client is allergic to any component of the medication and has had a previous anaphylactic reaction to any drugs in the same classification of medications.

Anaphylaxis usually occurs on a subsequent exposure to an allergen however, it can occur on a first exposure as well.

Often clients may state they are "allergic" to a medication or food when in fact they may only experience a side effect or sensitivity to the antigen. For example; if a client experiences nausea or stomach pain when taking aspirin-this is considered a side effect, not an allergy. It is important to question why the client feels they are allergic to any allergen and what the actual response was from it. This way the nurse can determine what type of response may have been experienced and whether it is important to consider this item to be an allergen for this client.

It is always best for the client to check with an allergist and be tested in a clinical environment if they are experiencing sensitivities to specific allergens. Interesting enough, idiopathic anaphylaxis (reacting where no cause is identified) accounts for up to two thirds of persons who present to an allergist / immunologist.

The nurse should consult with the appropriate professional any time there is concern that the client may have allergies or past adverse reaction to a medication. Parents/clients should be advised to report any significant adverse reaction to the medication given.

Objective 3-Signs and Symptoms of Anaphylaxis

Fainting, Anxiety and Breath-holding

Anaphylaxis must be distinguished from fainting (vasovagal syncope), anxiety and breath-holding spells, which are more common and benign reactions.

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. Fainting is managed simply by placing the patient in a recumbent position.*

Recovery of consciousness occurs within a minute or two, but patients may remain pale, diaphoretic and mildly hypotensive for several more minutes. The likelihood of fainting is reduced by measures that lower stress in those awaiting [injection or] immunization such as short waiting times, comfortable room temperature, preparation of vaccines out of view of recipients and privacy during the procedure. To reduce injuries during fainting spells those at risk are best immunized while seated.

People experiencing an anxiety spell 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. Treatment consists of reassurance and rebreathing using a paper bag until symptoms subside.

Breath-holding spells occur in some young children when they are upset and crying hard. 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. Similar spells may have been evident in other circumstances. No treatment is required beyond reassurance of the child and parents.

*In the case of anaphylaxis, 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.** It occurs only as a late event in severe cases.*

Source: Canadian Immunization Guide-6th Ed. Health Canada, 2002 copied with permission as stated at www.phac-aspc.gc.ca/notices_e.html, by the College of LPNs of Alberta, November 2004.

Anaphylaxis

Anaphylactic reactions may include a combination of common signs and symptoms. Usually respiratory symptoms, angioedema, hives and then fainting are the most common symptoms.

Respiratory symptoms include dyspnea, wheezing, and upper airway obstruction. This is due to the rapid onset of increased secretion from mucous membranes, increased bronchial smooth muscle tone, decreased vascular smooth muscle tone, and increased capillary permeability occurring after exposure to an allergen.

Approximately 1/3 of those affected will experience gastrointestinal symptoms including nausea, vomiting, diarrhea, and abdominal pain. An additional 1/3 will experience cardiovascular symptoms like dizziness, syncope, and hypotension. Approximately 1.5 percent will experience seizure.

Anaphylactic reactions generally begin within a few minutes or up to 30 minutes, but almost always within 2 hours after antigen exposure. Some employers have policies in place regarding an observation time following administration of parenteral medications. These policies may expect the nurse to closely observe the client for 10-15 minutes or more following administration of medications.

The cardinal features of anaphylaxis are:

- *itchy, urticarial rash (in over 90% of cases);*
- *progressive, painless swelling (angioedema) about the face and mouth, which may be preceded by itchiness, tearing, nasal congestion or facial flushing;*
- *respiratory symptoms, including sneezing, coughing, wheezing, laboured breathing and upper airway swelling (indicated by hoarseness and/or difficulty swallowing) possibly causing airway obstruction;*
- *hypotension, tachycardia, which generally develops later in the illness and can progress to cause shock and collapse;*
- *nausea, abdominal pain.*

An inconsistent early feature is swelling and urticarial rash at the injection site. This is more likely to be evident with vaccines [medications] injected subcutaneously rather than intramuscularly.

Anaphylaxis is described as mild or early when signs are limited to urticarial rash and injection site swelling. At this stage symptoms may arise from other systems (e.g., sneezing, nasal congestion, tearing, coughing, facial flushing) but are associated with minimal dysfunction. Features of severe [advanced anaphylaxis] disease include obstructive swelling of the upper airway, marked bronchospasm and hypotension.

Source: Canadian Immunization Guide-6th Ed. Health Canada, 2002 copied with permission as stated at www.phac-aspc.gc.ca/notices_e.html, by the College of LPNs of Alberta, November 2004.

Objective 4-Management of Anaphylaxis

The initial management of anaphylaxis is key to the outcome of the client. Anaphylaxis is life threatening. If not treated the client's airway may close off from swelling, resulting in death. Note that a child's airway is considerably smaller than an adult, thus increasing the risk.

A specific assessment is necessary to determine if in fact, you are dealing with anaphylaxis. The most important component to management of the client is of course, airway. Secondary to airway is the administration of epinephrine.

Epinephrine has a rapid onset but a short duration of action, therefore it is vital for the LPN in a non-hospital setting to understand the protocol for management of anaphylaxis and initiate a call for emergency medical services immediately.

Anaphylaxis: Initial Management in Non-Hospital Settings

The following steps describe the management of anaphylaxis. Steps 1 to 4 are meant to be done rapidly or simultaneously. **The priority is prompt administration of epinephrine (step 4),** which should not be delayed if earlier steps cannot quickly be completed.

- 1. Call for assistance**, including an ambulance.
- 2. Place the patient in a recumbent position** (elevating the feet if possible).
- 3. Establish an oral airway** if necessary, and loosen restrictive clothing.

4. Promptly administer epinephrine:

Speedy intervention is of paramount importance; failure to use epinephrine promptly is more dangerous than using it improperly.

The subcutaneous route of epinephrine injection is appropriate for mild or early cases, and a single injection is usually sufficient. Severe cases should receive intramuscular injections because they lead more quickly to generalized distribution of the drug. A different limb is preferred for each dose to maximize drug absorption.

The following dosage is a guide only. The nurse is responsible to follow the anaphylactic protocol of the employing agency.

Adults: 0.01 ml/kg (maximum 0.5 ml) epinephrine 1:1,000 (Adrenaline) into non-injected limb. Give one repeat dose if no improvement in 2-10 minutes. Do not exceed 1 mL in 1 hour.

Children:

Under 5 years: 0.1 ml epinephrine 1:1000, (Adrenaline) into non-injected limb.

5-9 years: 0.2 ml epinephrine 1:1000, (Adrenaline) into non-injected limb. Give one repeat dose if no improvement in 2-10 minutes. Do not exceed 0.5 ml in 1 hour.

10-15 years: 0.3 ml epinephrine 1:1000, (Adrenaline) into non-injected limb. Give one repeat dose if no improvement in 2-10 minutes. Do not exceed 0.8 ml in 1 hour.

A different limb is preferred for each dose to maximize drug absorption.

The epinephrine dose should be carefully determined. Calculations based on body weight are preferred when weight is known. Recording the weight of children before [injection] is recommended when feasible.

Some environments such as public health use protocols like this chart adapted from the Canadian Immunization Guide, 2002

Appropriate Dose of Epinephrine According to Age

Age	Dose	
2 to 6 months*	0.07 ml	(0.07 mg)
12 months*	0.10 ml	(0.10mg)
18 months* to 4 years	0.15 ml	(0.15 mg)
5 years	0.20 ml	(0.20 mg)
6-9 years	0.30 ml	(0.30 mg)
10-13 years	0.40 ml†	(0.40 mg)
> 14	0.50 ml†	(0.50 mg)
Frail Elderly	0.30 ml††	(0.30 mg)

* Dose for children between the ages shown should be approximated, the volume being intermediate between the values shown or increased to the next larger dose, depending on practicability.

† For a mild reaction a dose of 0.3 mL can be considered.

†† As per policy in David Thompson Health Region Community Nursing.

Excessive doses of epinephrine can add to patients' distress by causing palpitations, tachycardia, flushing and headache. Although unpleasant, such side effects pose little danger. Cardiac dysrhythmias may occur in older adults but are rare in otherwise healthy children.

The anaphylactic state in patients receiving beta-adrenergic antagonist therapy (for elevated blood pressure) will be more resistant to epinephrine therapy.

Since anaphylaxis is rare, epinephrine vials and other emergency supplies should be checked on a regular basis and replaced if outdated.

Adrenaline kit contents:

Copy of the anaphylaxis procedures/doses

2 – 1 cc syringes with attached needles (1 – 25 gauge, 5/8" needle/1 – 25 gauge, 1" needle)

2 vials of adrenaline 1:1,000 (within expiration time frame)

1 vial of diphenhydramine

1 – 25 gauge, 5/8" needle (extra)

1 – 25 gauge, 1" needle (extra)

2 alcohol swabs (optional)

Protocols for administration

4a. If the [medication] was injected subcutaneously, an additional dose of 0.005 mL/kg (maximum 0.3 mL) [check agency policy for correct dosages] of aqueous epinephrine 1:1,000 can be injected into the vaccination [injection] site to slow absorption. This should be given shortly after the initial dose of epinephrine, in moderate to severe cases. It is generally not repeated. Local injection of epinephrine into an intramuscular [injection] site is contraindicated because it dilates vessels and speeds absorption.

4b. As an adjunct to epinephrine, a dose of diphenhydramine hydrochloride (Benadryl®) can be given. It should be reserved for patients not responding well to epinephrine or to maintain symptom control in those who have responded to epinephrine (epinephrine being a short-acting agent), especially if transfer to an acute care facility cannot be effected within 30 minutes. Oral treatment (oral dose: 1-2 mg/kg to a maximum single dose of 100 mg) is preferred for conscious patients who are not seriously ill, because Benadryl® is painful when given intramuscularly. This drug has a high safety margin, making precise dosing less important.

5. Monitor vital signs and reassess the situation frequently, to guide medication use.

6. Arrange for rapid transport 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. For all but the mildest cases of anaphylaxis, patients should be hospitalized overnight or monitored for at least 12 hours.

Sources:

1) Canadian Immunization Guide-6th Ed. Health Canada, 2002 www.phac-aspc.gc.ca/notices_e.html, by the College of LPNs of Alberta, November 2004.

2) Tang, A., (2003, October 1) *A Practical Guide to Anaphylaxis*. American Family Physician. Retrieved October 28, 2004 from www.aafp.org/afp/20031001/1325.html

3) Review and input provided by Community Nursing Practice Managers in Capital Health and David Thompson Health Region.

Optional Reference: <http://www.hc-sc.gc.ca/english/iyh/medical/allergies.html>
<http://www.anaphylaxis.org/>

Epi-Pens are usually prescribed by the physician for an individual to use in an anaphylactic reaction to a known allergen. The patient and family would have received instruction into the use of the pen and the symptoms of an anaphylactic reaction so they can identify when it is necessary to self administer the epinephrine.

Most health care agencies do not use an Epi-Pen to treat anaphylaxis. **The nurse who is administering medications or vaccines within the non-hospital settings (i.e., clients home, community clinic, and school environment) must have access to an Adrenaline Kit to properly manage anaphylaxis.**

It is also important to review the policy and procedures within individual employment settings to understand the expectations of each specific employer. Access to anaphylaxis protocols within all settings is also necessary.

Epinephrine is considered emergency medical treatment and must be followed by appropriate emergency medical treatment and observation in a hospital.

Objective 5-Documenting and Reporting

It is vital to the clients' safety and full recovery that complete documentation of all interventions given in the management of anaphylaxis. Prior to the ambulance arrival, it is of key importance that the nurse has clearly documented all medications given and the clients' reactions to them. Employers should have documentation protocols to use when managing anaphylaxis and it is important the nurse is aware of these protocols.

Following a drug reaction it is important to follow the employer policy and procedures to document and report the incident appropriately. Health Canada encourages reporting of all adverse reactions to assist in the ongoing collection of data to enhance the safety and effectiveness of medications used throughout Canada.

Additional Resource: Health Canada website:
Adverse Reaction Reporting by Health Professionals and Consumers,
http://www.hc-sc.gc.ca/hpfb-dgpsa/tpd-dpt/ar_reporting_brochure_e.html



Exercise:

This exercise is a good form of evaluation and allows the LPN the opportunity to review their knowledge to be sure they are competent to manage anaphylaxis.

1. The cardinal signs of anaphylaxis are:

- a.
- b.
- c.
- d.

2. List the five steps of Management of Anaphylaxis:

- 1.
- 2.
- 3.
- 4.
- 5.

3. Describe the action, route, dosage and side effects of epinephrine using the following chart.

Purpose (Therapeutic Effect)	
Action	
Dosage Range	
Route	
Side and Adverse Effects	
Pertinent Information	
Nursing Implications	

Answers to Exercise:

1.

- a. Itchy, urticarial rash.
- b. Progressive, painless swelling (angioedema).
- c. Respiratory symptoms.
- d. Hypotension and unconsciousness.

2.

1. Call for assistance or ambulance.
2. Position client in recumbent position, elevating feet.
3. Establish an oral airway if necessary.
4. Administer epinephrine into opposite limb. Know agency protocol for dosage.
5. Monitor vital signs-arrange transport.

The most important step is administration of Epinephrine.

3.

- **Purpose**-in emergency treatment of anaphylactic reaction, epinephrine acts as a bronchodilator, it causes narrowing of the blood vessels resulting in the opening of the bronchial tubes.
- **Action**-Epinephrine has a rapid onset of action, it stimulates the sympathetic nervous system. It is the initial drug for treating bronchoconstriction and hypotension resulting from anaphylaxis as well as all forms of cardiac arrest. It is useful in managing reactive airway disease.
- **Dosage Range**-0.01 ml per kg. to 0.5 ml per kg. of body weight. See chart for age specific dosing.
- **Route**-Subcutaneous or Intramuscular injection. May also be given IV in hospital setting.
- **Pertinent Information**-
 - Indications: bronchial asthma, acute allergic reaction, cardiac arrest, asystole.
 - Contraindications: hypersensitivity, hypovolemic shock, coronary insufficiency, hypertension.
 - Adverse Reactions: headache, nausea, restlessness, weakness, dysrhythmias, hypertension.
 - Nursing Implications: be aware of protocols for repeating dosage as necessary. Implement the steps of management of anaphylaxis. Observe for adverse reactions to Epinephrine.

References

- 1) Health Canada, (2002), *Canadian Immunization Guide, (6th ed.)* Ottawa, ON.
- 2) College of Licensed Practical Nurses of Alberta, (August 2002) *Immunization Certificate Course for Licensed Practical Nurses*, Edmonton, AB.
- 3) College of Licensed Practical Nurses of Alberta, (2004). *Competency Profile for Licensed Practical Nurses, 2nd Edition*. Edmonton, AB.
- 4) Tang, A., (2003, October 1) *A Practical Guide to Anaphylaxis*. American Family Physician. Retrieved October 28, 2004 from www.aafp.org/afp/20031001/1325.html
- 5) Potter, P.A., & Perry, A.G. (1999). *Basic Nursing, A Critical Thinking Approach, 4th Edition*. Baltimore, MA: Mosby.
- 6) Anaphylaxis Canada. www.anaphylaxis.org
- 7) Child Health Alert www.childhealthalert.com/newsletters/mar98.htm