Welcome to the Second Module in the Pre-Study!

Module 2 relates to the principles and procedures regarding storage, handling and administration of vaccines.

This Module also reviews the injection administration standards, adverse reaction management and latex allergy.
Module Two: Practical Considerations

LEARNING OBJECTIVES:
1. Explain principles and procedures for vaccine procurement, storage, and handling.
2. Review the standards of practice guiding injection administration.
3. Describe a system for administering and recording injections.
4. Explain procedures for medication error and adverse drug reaction reporting and general anaphylaxis diagnosis and management.
5. Discuss other injectable medications that may be administered and general information regarding the tools for injections.
6. Review information about the management of latex allergy and egg allergy.

Note: During the Pre-Study you will be directed to additional linked resources. If the link does not open immediately, please copy and paste the web url into a browser of your choice.
COMPETENCY:
Implement Canadian guidelines when storing, handling or transporting vaccines.

Part I:
Explain principles and procedures for vaccine procurement, storage, and handling.

REQUIRED READING:

a) National Vaccine Storage and Handling Guidelines for Immunization Providers – 2015 (PDF version available on website).


c) Another article on cold chain from the Seasonal Influenza Immunization Policy for Pharmacists (Alberta Health) is accessed from:
   https://pharmacists.ab.ca/sites/default/files/ColdChainManagement.pdf

KEY TERMS AND LEARNING:
Cold chain management, record-keeping, cold chain breaches, storage requirements for vaccines and other pharmaceuticals

Cold Chain
Vaccines are biological products which may become less effective, or even be destroyed, if exposed to light or temperatures outside the recommended range as do other non-vaccine pharmaceuticals that require refrigeration. “Cold chain” refers to the process used to maintain optimal conditions during the transport, storage, and handling of vaccines, starting at the manufacturer and ending with the administration of the vaccine to the client. The optimum temperature for refrigerated vaccines is between +2°C and +8°C. For frozen vaccines the optimum temperature is -15°C or lower. In addition, protection from light is a necessary condition for some vaccines. Breaches in the cold chain can result in reduced or lack of potency of the product and vaccine losses are expensive and may exacerbate existing supply problems. Proper storage, record keeping, and management of vaccines and other refrigerated pharmaceuticals is essential and procedures must be in place for each pharmacy. All pharmacy staff must follow these policies and cleaning and maintenance staff should also be briefed on them. An article regarding refrigerated...
pharmaceuticals, including vaccines, written specifically for pharmacy technicians (but also applicable to pharmacists) is available at:
It discusses the receipt, storage, and handling of vaccines as well as cold-chain management. Recording of refrigerator temperature logs is very important to cold chain maintenance. The Seasonal Influenza Immunization Policy for Pharmacists indicates that temperatures be recorded at least three times per day in pharmacies open for more than nine hours.47

See Appendix A for a sample refrigerator temperature log that can be used to monitor fridge temperatures.

An estimated 17% to 37% of healthcare providers expose vaccines to improper storage temperatures. Refrigerator temperatures are more commonly kept too cold rather than too warm. Vaccines are sensitive biological products that may become less effective, or even destroyed, when exposed to temperatures outside the recommended range and/or on exposure to direct sunlight or fluorescent light. Cold-sensitive vaccines experience an immediate loss of potency following freezing.46

Please also refer to the Alberta Health Services: Checklist for Safe Vaccine Handling and Storage indicates the following ‘essential’ and ‘strongly recommended’ practices.

**Essential:**
• Have a designated person in charge of the handling and storage of vaccines
• Keep extra containers of water in the refrigerator exclusively to help maintain cold temperatures (top and bottom shelves and door shelves of refrigerator)
• Have a “Do Not Unplug” sign next to the refrigerator’s electrical outlet
• Always keep a minimum/maximum thermometer in the refrigerator
• Store vaccines in the middle of the refrigerator and NOT in the door
• Do NOT store any food or drink in the refrigerator
• Immediately put multi-dose vaccine vials back in fridge after dose has been withdrawn

**Strongly recommended:**
• Refrigerator for vaccine storage is either laboratory grade (ideal) or domestic (acceptable)
• The freezer compartment has a separate door
• Min/max thermometer is alarmed with alarm set at +3C and +7C

If you are transporting vaccines to off-site locations, use insulated storage containers with ice packs for transport, but do not place the vaccines directly in contact with ice packs (freeze). You may use bubble wrap to protect vaccine. See Section 9.3 of The National Vaccine Storage and Handling Guidelines for Immunization Providers for further details.46
COMPETENCY:
1. Document information relevant to each injection encounter in accordance with national and provincial guidelines and jurisdictional health information processes.

2. Anticipates, identifies, and manages adverse events following immunization [and other injections] as appropriate to the practice setting.

Part II:
Review the standards of practice guiding injection administration.

REQUIRED READING:
a) The Alberta College of Pharmacists Standards of Practice for Pharmacists and Pharmacy Technicians:⁴⁸ (Standards related to injections) are available at:
https://pharmacists.ab.ca/sites/default/files/StandardsOfPractice.pdf

KEY TERMS AND LEARNING:
Policies and procedures for emergencies, steps required for safe administration of injections (before and after), routine precautions for injections

The Alberta College of Pharmacists has specific standards of practice related to the administration of drugs by injection (Standards 16 and 17). These standards guide all injection administration by pharmacists and must be clearly understood and adhered to. The pharmacist must obtain informed consent from the patient and ensure that the prescription received is current, appropriate, complete, and authentic (Standard 17). A sample informed consent document (Appendix B) is included in the course material. The procedure for obtaining and documenting informed consent of patient and/or patient’s agent should include:

• Name of immunization
• Disease being prevented
• Benefits and risks
• Expected reaction
• Usual side effects
• Rare side effects
• Rationale for 15–30 minute observational period
• Contacts for follow-up or emergency
What should the pharmacist check?
• It is essential that the pharmacist assess the drug order for appropriateness.
• The pharmacist must check prescription and/or immunization protocol regarding appropriateness to patient need/status/age, appropriate dose, allergies, patient rights, and weight (to assist in dosing anaphylaxis medications if necessary), and check contraindications to administering medication as prescribed.
• Check the prescriber’s order (if applicable) and ensure you are following the proper protocols and that the drug is not expired.
• The pharmacist must also check the 7 rights of medication administration (right patient, right medication, right dose, right route, right time, right reason, and right documentation).
• The pharmacist must perform 3 checks to ensure the correct drug and dose has been prepared.
• Prior to administration of an injection, the pharmacist must also document and discuss with the patient the potential side effects of the drug to be administered and any other relevant teaching, and outline the procedure for administration.
• The pharmacist should also understand what therapeutic monitoring is required after the drug has been administered.

Standard 16.3 of the Standards of Practice for Pharmacists and Pharmacy Technicians states that the pharmacist must ensure the environment within which the injection will be administered is clean, safe, appropriately private and comfortable for the patient. An appropriate area fitting these criteria must be designated prior to provision of an injections service. The designated area should contain an area for records, patient information, and all emergency supplies.

Part III:
Describe a system for administering and recording injections.

KEY TERMS AND LEARNING:
Record keeping and documentation requirements

Record Keeping
Proper record keeping for injections, including vaccines, is essential to ensure individuals have a current, accurate, and complete immunization or injection record. Communication with public health agencies or regional health zones may be necessary in the administration of vaccines. Pharmacists should contact their regional public health division to determine what, if any, information is required to be forwarded to them for each type of vaccine they administer and what
information may need to be accessed prior to vaccine administration (e.g., pneumococcal vaccine status). Currently, there is no single vaccine registry in Alberta. Patient information is still stored in several different databases depending on the old health care regions. Immunization records may be attained by the patient via Alberta Health Services Immunization Records Request. For vaccine information, www.albertahealthservices.ca/services.asp?pid=service&rid=5676. Pharmacists may want to develop a standard injection record for their pharmacy. A standard communication form for the patient’s family physician may also be developed. Some pharmaceutical manufacturers may also have resources such as documentation templates that can be accessed by pharmacists.

Pharmacists administering injections must perform appropriate documentation that must include:

• Drug/vaccine, dose, site of administration, and date given
• Patient demographics: name, date of birth, address, weight (for vaccines), etc.
• Client response: this may be documented as satisfactory but if there were adverse effects they must be documented along with how they were managed.
• Client consent and teaching/education
• Client follow up: call-backs, return visit to pharmacy, etc.

Record Storage and Retention
Pharmacists providing immunizations to their clients may want to consider the following when documenting records of injections:

• Medication administration is different than medication provision (dispensing). Pharmacy standards to retain prescriptions for 24 months after last fill (42 months total) would not be applied to therapeutic administrations. Pharmacists must keep the patient record, including records of injections administered (and client consents given) for 10 years past the last date of service or two years past the age of majority for the patient [whichever is greater].

* As an alternative to a paper system, pharmacists may want to check with their software vendor to see if this requirement can be met in their pharmacy software system, or may want to create their own recording system.

• Pharmacists administering injections should record the prescriber/authorizer of the medication, including themselves if that is the case. Although some medications a pharmacist may administer (e.g., Vitamin B, some vaccines such as influenza vaccine) do not require a prescription, the pharmacist should record the health professional recommending (essentially prescribing) these medications including themselves if that is the case.

• Although not yet required, pharmacists may want to record the lot number of vaccines administered in case of a manufacturer’s recall or adverse reaction.

* Alberta College of Pharmacists records retention chart, http://pharmacists.ab.ca/sites/default/files/RecordRetentionChart.pdf
Summary

Documentation
Pharmacists must observe the various requirements for documentation, specifically as they apply to:
• Dispensing
• Administration, and
• Prescribing of injections

Dispensing Requirements
As with any prescription, pharmacists are required to record necessary information electronically and maintain that record for up to 42 months after the prescription has been dispensed (24 months after the last fill of the prescription).

Administration Requirements
Administration of therapy to a patient must be recorded in the patient’s record of care in accordance with HIA guidelines. This would include the administration of immunizations/injections and would necessitate the retention of documentation for 10 years past date of last service to the patient. Data included in this record should facilitate identification of patient, details of drug or vaccine administered, pertinent health care provider information, record of patient consent, and any adverse reaction. This can be accomplished manually or electronically if the pharmacy software can accommodate this.

Prescribing Requirements
Currently, pharmacists who are prescribing are required to document their prescriptions in writing and also to document their intervention in the patient’s record of care. Depending on the schedule of the drug being administered, pharmacists without additional prescribing authorization may not prescribe these injections (Schedule I injections, which include most vaccines) but authorized pharmacists can administer them. Schedule II injections do not require a prescription, however an authorized pharmacist may recommend and administer them. Some examples of Schedule II injectables include Vitamin B₁₂ injection and influenza vaccine.

Records
Identical to other dispensed prescriptions, the pharmacist’s written prescription would require retention for up to 42 months. The information in the patient’s record of care would require retention for 10 years past the date of last service or two years past the age of majority for the patient, whichever is greater. This can be accomplished manually or electronically if the pharmacy software can accommodate this.

An example of a manual record is provided in Appendix C (Patient Record of Care—Administration of Injectable Medications) that may be included in the patient care plan. See Appendix A of the Standards of Practice for Pharmacists and Pharmacy Technicians for guidance on what information must be kept on the Record of Care for Drug, Blood Product or Vaccine Administered, https://pharmacists.ab.ca/sites/default/files/StandardsOfPractice.pdf
Appendix D shows a sample vaccine tracking record that can be used to advise the local public health unit that an immunization has been administered. It is important to have this information recorded on the patient’s permanent immunization record, especially since some immunizations should only be given once in a adulthood, e.g., pertussis vaccine. It is also important if the immunization is one of a series, e.g., HPV vaccine.

Canadian Immunization Registry Network (CIRN) has been trying to develop a National Immunization Registry for many years. The registry would benefit the individuals and the population in general by:

• Identifying children due or overdue for immunization, and generate recall/reminder notification to parents.
• Have the capacity to make appointments, and to provide a database for health care providers to monitor the immunization status of patients at each encounter, regardless of where the vaccine is administered.
• Assist in public health planning by identifying populations at risk for delayed immunization, thereby enabling health authorities to target interventions appropriately, and to evaluate the success of the program.
• In provinces where physicians deliver most immunizations, registries should be accessible and/or developed for their practice, see the Canadian Immunization Registry Network, http://healthycanadians.gc.ca/healthy-living-vie-saine/immunization-immunisation/index-eng.php

Vaccine Waste
Pharmacists may keep a record of vaccine wasted; this will also assist with inventory management and waste prevention. Universal precautions and proper disposal of injection materials will be covered in the live session of this course. Expired or wasted vaccine should be disposed of according to local waste management guidelines. The Alberta Occupational Health and Safety Code was updated to include information regarding healthcare and industries with biological hazards. See Part 35 Health Care and Industries with Biological Hazards available at: http://work.alberta.ca/documents/WHS-LEG_ohsc_p35.pdf Every pharmacist should become familiar with it.

Appendix E shows a sample form for recording vaccine that is wasted.
Part IV: Explain procedures for medication error and adverse drug reaction reporting and general anaphylaxis diagnosis and management.

Note: During the Pre-Study you will be directed to additional linked resources. If the link does not open immediately, please copy and paste the web url into a browser of your choice.

REQUIRED READING:


c) An abstract of the article Glucocorticoids for the treatment of anaphylaxis can be viewed at: http://www.ncbi.nlm.nih.gov/pubmed/20238355

KEY TERMS AND LEARNING:
Anaphylaxis, management of an anaphylactic reaction to a vaccine, emergency medications

COMPETENCY:
Anticipates, identifies, and manages adverse events following immunization [and injections] as appropriate to the practice setting.

Adverse Reactions
Adverse reactions to injectable immunizations and other injectable medications may occur and may require the use of emergency medications. Early Vaccine Reactions including Anaphylaxis Canadian Immunization Guide: Evergreen Edition, outlines the procedures for the initial management of anaphylaxis to vaccines in non-hospital settings. They discuss the use of epinephrine and the recommended contents of an emergency epinephrine kit.

After completing the reading, the pharmacist must be able to recognize and manage an adverse event, including anaphylaxis. Pharmacists may wish to post a flowchart in their injection area as well as having procedures and doses of emergency medications with their emergency medication kit. Pharmacists who administer immunizations and injectable medications must ensure they are able to properly manage anaphylaxis even though it rarely occurs.
They may wish to practice a simulated situation on a regular basis, similar to CPR training, to ensure they are competent in all procedures and all materials are available when needed. To review the physiology of anaphylaxis, http://medical-dictionary.thefreedictionary.com/Anaphylaxis

**Allergic and Anaphylactic Reactions to Vaccines**

**I. Recognition of Anaphylactic Reaction**

Most anaphylaxis reactions begin within 30 minutes after administration of vaccine. Therefore, vaccine recipients should be kept under observation for at least 15 minutes after immunization; 30 minutes is a safer interval when there is a specific concern about possible vaccine allergy.

Signs and symptoms develop over several minutes and by definition involve at least two body systems (e.g. the skin, respiratory, gastrointestinal or circulatory systems). The cardinal features of anaphylaxis are:  

- itchy, urticarial rash  
- 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  
- gastrointestinal symptoms, including crampy abdominal pain and vomiting  
- sudden reduced blood pressure or symptoms of end-organ dysfunction

**II. Emergency Supplies**

List of recommended items in an anaphylaxis management kit (Essential Items)

- A clear, concise summary of the anaphylaxis emergency management protocol  
- Laminated table of dosage recommendations for epinephrine and diphenhydramine hydrochloride (e.g. Benadryl) by weight and by age  
- Two vials of aqueous epinephrine 1:1000  
- A range of autoinjectors of epinephrine labelled by age and weight (optional)  
- One vial of injectable diphenhydramine hydrochloride  
- Two – 1 cc syringes with attached needles (1 – 25 gauge, 1 inch needle; 1 – 25 gauge, 5/8 inch needle)  
- One – 25 gauge, 5/8 inch needle (extra)  
- Two– 25 gauge, 1 inch and 1.5 inch needles (extra for larger adults)  
- Scissors  
- Alcohol swabs  
- One nasopharyngeal airway and one oropharyngeal airway for each age range anticipated in the clinic  
- Pocket mask  
- Stethoscope and sphygmomanometer  
- Tongue depressors  
- Flashlight  
- Wristwatch with second hand to measure pulse  
- Cell phone if no easy access to onsite phone
Read the CIG, Evergreen Editions, the reference for this section, for more detailed information http://www.phac-aspc.gc.ca/publicat/cig-gci/p02-03-eng.php

III. Emergency Treatment

If swelling and urticarial rash (i.e., hives) are confined to the extremity where the immunization was given, observe patient closely for 30 minutes, watching for generalized symptoms. 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 during the observation period, epinephrine should be given (see below).^{15}

Steps for basic management of anaphylaxis in a non-hospital setting
(Steps 1, 2, 3 should be done promptly and simultaneously)^{16}

1. Assess circulation, airway, breathing, mental status, skin, and body weight (mass). Secure an oral airway if necessary. Direct someone to call 911 (where available) or emergency medical services.

2. Position the vaccine recipient on their back or in a position of comfort if there is respiratory distress; elevate the lower extremities. Place the vaccinee on their side if vomiting or unconscious. Pregnant anaphylactic vaccinees should be placed semi-recumbent on their left side with their legs elevated.

3. Inject epinephrine intramuscularly in the mid-anterolateral aspect of the thigh: 0.01 mg/kg body weight of 1:1000 (1 mg/mL) solution
   - ADOLESCENT or ADULT: maximum - 0.5 mg
   - CHILD: maximum - 0.3 mg
   - Record the time of the dose.
   - Repeat every 5 to 15 minutes as needed, for a maximum of three doses.

4. Stabilize vaccinee; perform cardiopulmonary resuscitation if necessary, give oxygen and establish intravenous access if available and give adjunctive treatment (i.e. diphenhydramine hydrochloride or Benadryl®) if indicated.

5. Monitor vaccinee’s blood pressure, cardiac rate and function, and respiratory status.

6. Transfer to hospital for observation.

According to the World Health Organization^{52}, some common errors which can lead to adverse events from immunization include:
• Too much vaccine given in one dose
• Improper immunization site or route
• Syringes and needles improperly sterilized
• Vaccine reconstituted with incorrect diluent
• Wrong amount of diluent used
• Drug inadvertently substituted for vaccine or diluent
• Vaccine prepared incorrectly for use, (e.g. adsorbed vaccine not shaken properly before use)
• Vaccine or diluent contaminated
• Vaccine stored incorrectly
• Contraindications ignored (e.g. a child who experienced a severe reaction after a previous dose of a vaccine is immunized with the same vaccine)

REQUIRED READING:
a) PHAC-Reporting Adverse Events Following Immunization (AEFI) in Canada-A. Background

b) Section 35 of the Alberta Occupational Health and Safety Code 2009,

KEY TERMS AND LEARNING:
Reporting immunization reactions — who, what, when, why, and where; needlestick injury

Medication Errors
Reports of medication errors are vital. Some examples of errors include wrong person, wrong dose, wrong vaccine, wrong time, wrong route, wrong reason, or wrong documentation. Pharmacists should have checking processes in place to minimize the risk of these errors. Individual pharmacies may have their own medication error reporting system set up and this should be adhered to. See the Alberta College of Pharmacists Drug Error Management information:
https://pharmacists.ab.ca/drug-error-management and their Drug Incident Report Form:

Adverse Reactions
Reporting of injectable or vaccine reactions is vital. If an adverse reaction occurs to either an injectable medication or vaccine, you are strongly encouraged to report it to Health Canada. You should also report it to the patient’s physician and you may wish to notify your local public health agency regarding vaccine reactions as well to help ensure the patient’s records are complete. PHAC-Reporting AEFI in Canada-Background

Also, PHAC Guidelines for Reporting Adverse Events Associated with Vaccine Products, provides excellent information on the various roles played in the reporting of adverse events by health care providers and of the collection of this data on a provincial and national level as well as its connection to industry, http://www.publications.gc.ca/collections/Collection/H12-21-3-26-1Eb.pdf

Workplace Safety
Alberta's Occupational Health and Safety Code 2009 discusses new requirements for the use of sharps in the workplace. It requires (as of July 1, 2010) that safety-engineered medical sharps must be used in the workplace. As noted in their document:

A "safety engineered medical sharp" is a medical sharp that is designed to, or has a built in safety feature or mechanism that eliminates or minimizes the risk of accidental parenteral contact while or after the sharp is used; parenteral contact means piercing mucous membranes or the skin.

Specially designed medical sharps e.g. hollow bore needles, suture needles, scalpels, etc. reduce the risk of needlestick injuries and other puncture wounds from contaminated sharps. Self sheathing needles have a built in sheath or sleeve that extends to cover the needle. Retractable syringes are designed so the needle can be pulled up inside the syringe (pp. 35–2).

Additionally, section 530 on post-exposure management states:

Employers are required to have policies and procedures describing employer and worker responsibilities in the event that a worker is exposed to biohazardous material. As required by section 8 of the OHS Regulation, these policies and procedures must be in writing and available to workers.

In case of an exposure, including needlesticks and other sharps related injuries, the employer needs to ensure that first aid and medical attention are available to the worker. Details of the exposure need to be recorded, the significance of the exposure assessed, and follow up advice provided.

For harmful exposures, follow up actions may include making arrangements for confidential post exposure counseling, medical evaluation, or medical intervention by a qualified person.

Workers need to be aware of the procedures they must follow to obtain immediate first aid. Incidents of exposure to biohazardous materials must be reported as soon as possible to a supervisor and first aid attendant, and recorded in the First Aid Record Book (pp. 35–11).
As outlined above, the proper equipment/supplies and policies and procedures must be in place in order to administer injections in a pharmacy.

→ Did you know? There are several different routes of administration for immunizations. While most immunizations are given by a parenteral route (intradermal, intramuscular, subcutaneously), there are some vaccines that are given orally or by intranasal route. For more information regarding the guidelines on administering intranasal influenza vaccine, see Appendix G.

Part V:
Discuss other injectable medications that may be administered and general information regarding the tools for injections.

KEY LEARNING:
Injection competencies for non-vaccine injections

Non-Vaccine Injections
Injectable medications (other than vaccines), may be administered by authorized pharmacists. Examples of some of these medications include Vitamin B$_{12}$, antibiotics, anti-psychotics, erythropoietin, iron, and medroxyprogesterone acetate depot. As with immunizations, pharmacists must determine their individual competence to safely administer these medications and adhere to all applicable legislation, including ACP Standards of Practice for Pharmacists and Pharmacy Technicians surrounding their administration. Each drug will have its own considerations as to administration, patient factors, adverse effects, contraindications, monitoring, and so on. The pharmacist must consult product monographs and package inserts and other relevant references to ensure proper administration and patient care. Patient assessment, education, monitoring, follow-up and record keeping must be completed.

For administration of ongoing therapy (e.g., Vitamin B$_{12}$ injections) pharmacists may wish to develop a reminder system for patients to set up appointments for their next injection.
Needles and Syringes
The selection of a needle and syringe depends upon the medication, dose, site of administration, and patient characteristics (i.e. muscle mass). Most often, 1 ml or 3 ml syringes are used for vaccines but this may differ with other injectables. The smallest bore needle often provides the greatest comfort for the patient. A subcutaneous injection often uses a 25–27 gauge needle, whereas intramuscular injections may use a smaller gauge needle (22–25 gauge).

→ Did you know? Needles are sized by gauge, with larger numbers representing smaller needle bores.

Part VI:
Review information about the management of latex allergy and egg allergy.

REQUIRED READING:
a) A comprehensive summary of how to manage a patient with diagnosed or suspected allergy to latex can be found at:
  http://www.uam.es/departamentos/medicina/anestesia/gtoa/latex/manage.htm

b) Alberta Health Services Influenza Immunization Workbook 2015–2016 ‘Who Should or Should Not Be Immunized’, page 14-16:

KEY TERMS AND LEARNING:
Causes and risks associated with latex allergy, types of adverse reactions, management, egg allergy

Latex allergy is an allergic reaction to certain proteins found in natural rubber latex. Persons who are at risk of latex allergy often have had prolonged or frequent exposure to latex products. Latex allergy may cause a reaction ranging from sneezing or runny nose to anaphylaxis. It is important that the pharmacist understand latex allergy and how to manage a latex-allergic patient or staff and that every patient receiving injections is screened for this allergy.
TYPES OF REACTIONS:
Three types of adverse health reactions to gloves and medical products that contain natural rubber latex (NRL) can occur:

Irritant Contact Dermatitis:
A non-allergic skin rash characterized by hand erythema, pruritus, dryness, and cracking. This reaction is caused by skin irritation from using gloves and possibly by contact exposure to other workplace products and chemicals.

Allergic Contact Dermatitis (delayed-type hypersensitivity):
A specific immune response to the chemical additives, such as accelerators or antioxidants (thiurams, carbamates, phenylenediamine) added to natural rubber latex (NRL) during harvesting, processing, or manufacturing of NRL products. Acute dermal reactions include erythema and vesicle formation. The lesions typically appear 24–96 hours after exposure.

NRL Allergy (immediate-type hypersensitivity):
Certain NRL proteins may cause the induction of IgE antibodies. Reactions usually begin within minutes of exposure of a sensitized individual to NRL allergens, but they can occur hours later. Mild allergic reactions to NRL involve skin redness, hives, or itching. More severe reactions may involve respiratory symptoms such as runny nose, sneezing, itchy eyes, scratchy throat, bronchospasm, asthma, gastrointestinal upset, abdominal pain and diarrhea. Anaphylaxis and death have occurred following NRL exposure.

The main risk factor in producing sensitization or inducing allergic reaction is exposure to certain NRL proteins. The amount of NRL protein exposure necessary to sensitize an individual is unknown. NRL proteins responsible for sensitization and or allergic reactions have been shown to attach or adsorb to cornstarch that is used in powdered NRL gloves to facilitate donning. When the gloves are changed, NRL protein/powder particles are aerosolized and may be inhaled or may contact mucous membranes. Frequent contact with NRL products increases the risk for sensitization and developing NRL allergies. While NRL exposure is the primary factor for developing NRL sensitization and allergy, certain populations are more susceptible to develop sensitization or NRL allergies based on pre-existing conditions. Some of these conditions include: atopy, allergies to certain foods (e.g., avocado, banana, tomato, chestnuts, kiwi fruit, papaya, etc.), hand dermatitis, frequent or long term urinary catheterization, and multiple dental and/or surgical procedures. Also consider allergies to pineapple.
Egg Allergies:
Egg allergies can affect whether or not people may receive vaccines or injectables made with or grown in egg proteins. For information about egg allergies and the seasonal influenza vaccine specifically, http://www.albertahealthservices.ca/assets/healthinfo/hi-flu-influenza-workbook.pdf