First aid provider responsibility

A first aid provider's responsibility is to take charge of an emergency situation through definitive command and confident action. Below is a description of your responsibilities as a first aid provider when handling an emergency situation.

As a first aid provider, your responsibility is to assist an injured or sick person. A basic understanding of human anatomy and physiology is essential. Because you will communicate with other pre-hospital care workers, it is important to know the terminology used to describe aspects and components of the human body.

Consent

Before giving first aid to an injured person, it is necessary to ask for their permission to do so. Identify yourself and ask, *"May I help you?"*

Anatomy and Physiology

The body

The human body is a complex organism composed of billions of cells working together in an organized manner for the benefit of the whole system.

The cell is the fundamental unit of structure and function. Cells are grouped into tissues, tissues into organs, and organs are grouped into systems. The entire collection of systems becomes the organism known as a human being.

Cells

Cells use oxygen (O2) and glucose (sugar) to produce the energy they need to survive, function and produce heat. Glucose penetrates the cell membrane with the help of insulin. Insulin is a hormone produced by the pancreas. Without sufficient insulin, glucose fails to penetrate the cell membrane; less energy is produced and cells cannot function as they should.

Brain cells are an exception: glucose can penetrate these cells without insulin.

The respiratory system

The respiratory system is responsible for the exchange of gases between the body and the environment. In conjunction with the circulatory system, it supplies oxygen to the body tissues, and helps in the removal of carbon dioxide, which is a waste product, from the body's tissues.

Normal respiration requires five conditions:

1. A supply of normal air

2. A clear airway

3. The mechanical bellows function of the rib cage and diaphragm must be intact and contain at least one functioning lung

4. The control system, including the brain, must be intact and able to respond to changing carbon dioxide levels in the blood stream

5. An adequate blood supply with proper circulation by the heart

Inspiration

Inspiration (inhalation) is an active function. The rib muscles contract raising the ribs and expanding the chest. The diaphragm muscle also contracts and flattens out resulting in an enlarged chest cavity. As the chest cage becomes larger, the lungs expand. Of the air exchanged in the lungs, two-thirds is caused by the movement of the diaphragm muscle, one-third by the muscles that move the ribs.

During inspiration:

1. The chest cavity enlarges.

2. The air pressure within the chest falls, and more air rushes into the lungs.

Expiration

Expiration (exhalation) is a passive function and normally requires no muscular exertion. On expiration, the rib muscles and diaphragm relax, the chest contracts and air is expelled from the lungs. Any hole in the chest wall will destroy the vacuum inside and the

lung will collapse because of its elastic nature and the effects of the pressure differential.

The mechanics of breathing are under the autonomic control of the brain.

The lymphatic system

The lymphatic system consists of lymphatic capillaries, vessels, glands, ducts, and spleen. From a first aid standpoint, the most important of these organs is the spleen.

Exposure to infectious diseases

Because blood-borne diseases can be transmitted from saliva-to-blood or from blood-to-blood contact, patrollers and first aid providers who come in contact with infected persons are at risk in the following circumstances:

• The patroller has a laceration, abrasion or other fresh injury to his skin permitting contact with the blood or bloody body fluids of an infected person;

• The patroller has an oral lesion or other injury to the mucous membrane lining of his mouth, such as a tongue bite, and gives artificial respiration to an infected patient.

Generally speaking, non-bloody body fluids of an infected person pose a small risk to those with a skin break. Yet, it is impossible to guarantee that this risk does not exist. Therefore, patrollers with open sores or wounds should avoid direct contact with the body fluids of those they treat. Casual contact between infected and non-infected individuals is not dangerous.

Signs, symptoms and transmission of infectious diseases

Hepatitis

Infectious hepatitis is caused by a number of different viruses, some of which have not yet been fully identified.

Hepatitis A and hepatitis E viruses cause fever, diarrhea, flu-like symptoms and jaundice (yellowing of the skin and eyes). These infections are not generally fatal, resolve on their own without treatment and are contracted by ingesting the virus orally.

Hepatitis B, C, and D viruses, on the other hand, are much more serious. These viruses are spread through direct contact between your bloodstream and the blood or body fluids of someone who is infected. Hepatitis B is found in saliva and other body fluids such as urine, vomitus, sputum and feces. These viruses cause an acute liver infection, marked by fever and jaundice. The infection may:

• resolve completely (go away),

• progress rapidly to total liver failure causing death, or

• become a chronic infection that leaves the individual without symptoms but still able to infect others.

Chronic hepatitis results in cirrhosis. Cirrhosis refers to the severe scarring of the liver and can progress to liver cancer. Both cirrhosis and cancer are life threatening diseases.

Chronic hepatitis is much more common than HIV and is responsible for a greater number of deaths.

A vaccine that is more than 90 per cent effective now exists to protect individuals against hepatitis B. This vaccine is now widely used for routine childhood immunization. The hepatitis B vaccine does not prevent infections against other Hepatitis viruses. It should be noted that up to 10 per cent of those who receive the vaccine do not respond to it. Nonetheless, it is strongly recommended that all health care workers receive the hepatitis B vaccine.

The CSP recommends hepatitis A and B (and C when available) vaccination for all ski patrollers. In many jurisdictions, this is available through public health agencies at no cost for first responders

Universal precautions

Universal precautions refer to the routine use of barrier precautions, such as gloves, and other practices to avoid contact with body fluids. These barriers are aimed at preventing contact between the blood and body fluids of an injured person and the patroller's bloodstream.

Following the emergence of the first cases of AIDS, the Centre for Disease Control and Prevention (CDC) in the United States advocated the principle of "universal precautions" as a measure to reduce the risk of transmitting dangerous blood borne infections to health care workers.

People with infectious diseases such as HIV often show no signs that they are infected because of the long incubation period. Therefore, patrollers and first aid providers should assume that **all blood and body fluids are potentially infectious**.

Use caution in all contact with patients

Universal precautions were devised to protect the medical and paramedical professions. Practitioners of these professions are at a much greater risk of contacting infected blood than patrollers. Nevertheless, always practise universal precautions to reduce the risk of contracting any of the infectious diseases mentioned above.

Patient Assessment

Overview

The assessment process is your tool to:

Every situation is different but it is the same process every time. This will allow you to avoid hazards to yourself, the patient, and others who may be around. It will also allow you to get an initial sense of what has happened and how to manage the situation.• ensure the safety of yourself and others, • get help when you need it, • rationally and accurately evaluate the severity of a person's injuries • make prudent decisions about treatment and transportation

Breathing rate/ respirations

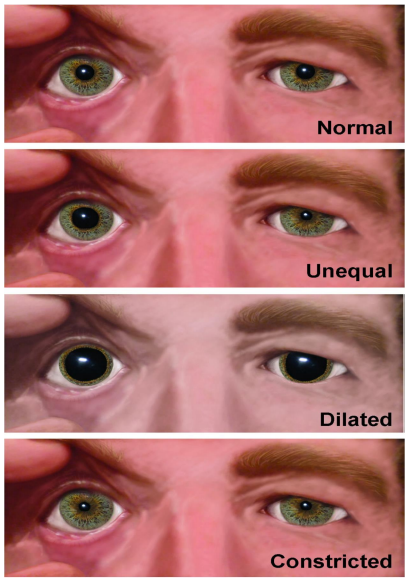
Observe rate, depth and effort needed to breath. Note airway sounds while you check the breathing as per the primary assessment. The secondary assessment also checks the rate.

Count the number of breaths/chest expansions in 15 seconds, then multiply by four. For example: four breaths in 15 seconds are recorded as 16 breaths per minute. The normal adult rate range is 12 to 20.

Breathing rates	**Possible causes**
None	Respiratory arrest
Slow (< 10 / min.)	Stroke,
	Head injury
	Overdose
	Chest injury
Fast (> 20 / min.)	Asthma
	Shortness of breath
	Chest injury
	Shock
Patterned	Head injury,
	Diabetic coma

Pupil reaction

Examine to find whether the **p**upils are **e**qual and **r**eactive to **l**ight - **PERL**. Normally, pupils dilate (enlarge) in dimmer light and constrict (become smaller) in brighter light. Note that up to 10 per cent of normal individuals have unequal pupils. The pupils of the eyes are good indicators of the condition of the circulatory system and the brain. Normal eyes react to light equally and quickly.



Pupil response	Possible causes
Equal and reactive	Normal
Non-reactive	Glass eye or contact lens
Fixed and dilated	Brain hypoxia
Unequal	Head injury or stroke, congenital
Fixed and constricted	Drug abuse or severe brain damage
Small, pinpoint	Drug usage or disease
Change from constricted to fixed and dilated	Worsening condition

Skin condition

Check the condition of the patient's skin:

• Colour - by looking at the patient's face

• Temperature - by placing the back of your hand on the patient's forehead

• Moisture - both visually and by touch

The condition of the skin is a good indicator of the circulation and oxygenation status of the patient.

Compare what you would expect the skin to be like given the patient's activity immediately prior to the accident, to what the skin is actually like. For instance, some activities may have caused the skin to differ from the usual pink, warm and dry. In the absence of strenuous activity, on a cold day the skin may be cool or even cold. After strenuous activity, such as during a race, it could be flushed, hot and sweaty.

Skin condition	Possible causes
Blue	Cyanosis Lack of oxygen
Pale, cool and clammy	Circulatory problems (shock, internal bleeding) Heat exhaustion Hypoglycemia (insulin shock)
Dry, warm, flushed	Hyperglycemia (diabetic coma)
Cold waxy	Hypothermia
	Severe frostbite
Red	Frostbite Burn
Yellow	Hepatitis/liver dysfunction
Flushed	Heat stroke
	Crushing chest injury

Head-to-toe exam

Recheck the core areas using the same techniques as the primary assessment (neck to knees).

Examine the head

Look for evidence of deformity, contusions, abrasions, penetrations, burns, lacerations and swelling.

Check for:

• Blood and/or fluid in the ears or nose.

• Bruising behind the ears (Battle's Sign).

• Bruising around the eyes (sometimes called "raccoon eyes"). Any of which may indicate a skull fracture.

Check the mouth for broken teeth, blood and/or a fractured lower jaw.

Feel the head for evidence of tenderness, instability and crepitus. Feel the face for fractures, particularly just under the eyes, the nose and the upper jaw.

Listen to what the patient tells you. Have the patient clench their teeth to check for pain in the jaw possibly indicating a fracture

Multiple patients - triage

Triage (French for "sort") is the process of sorting patients based on the seriousness of their injuries. Use triage if there are numerous patients involved to determine who may need help and who needs to be transported in what order. Patients are quickly assigned one of four colour codes as summarized in the following table.

START

This system of prioritising patients is called **S**imple **t**riage **a**nd **r**apid **t**reatment (START).

Handling of oxygen equipment and administration

There are two main concerns when using supplemental oxygen:

• Storage and handling of oxygen equipment; and

• Proper administration of oxygen.

Proper oxygen administration

Before administering oxygen, you must first prepare the equipment by following the steps below:

1. Make sure the tank contains oxygen.

2. Remove the shipping seal from the tank and save the gasket.

3. Open the tank valve for one second to clean debris from the valve. Make sure the regulatory pins match the tank.

4. Insert the gasket into the large cylinder opening.

5. Install the regulator and tighten.

6. Open the cylinder one full turn if the pressure in the main tank is at maximum.

7. Attach the delivery device to the flowmeter.

8. Set the required flow rate.

Oxygen can be administered to breathing patients or non-breathing patients.

Administering oxygen to a breathing patient

Follow the steps below if administering oxygen to a breathing patient: Do the following:

1. Explain the procedure to the patient.

2. Place mask over their face.

3. Recheck and adjust the flow meter.

4. Secure the equipment for transport.

5. Monitor vitals and maintain airway continually.

6. Be prepared to do artificial respiration in case of respiratory arrest.

If the patient cannot tolerate wearing the face mask, have them hold the mask close to their face until they can put the mask on. This does not deliver the same concentration of oxygen as wearing the mask but they will get some benefit from the oxygen.

Nasal cannulas do not deliver as much oxygen as a mask. However, some patients cannot tolerate a mask at all (e.g. claustrophobia), which make nasal cannulas the only option.

When the patient no longer needs oxygen administration, do the following:

1. Remove the mask from the patient's face.

2. Close the main regulator valve.

3. Refer to the manufacturer's documentation and follow the proper shutdown procedure for the equipment being used.

Administering oxygen to a non-breathing patient

Oxygen can be administered to a non-breathing patient using a pocket face mask or a bag-valve mask resuscitator. These units connect directly to the oxygen equipment by a delivery tube.

For patients suffering from cardiac arrest, use two-rescuer CPR procedures so that one rescuer can focus on keeping the mask in place and maintain the seal.

Pulse Oximetry

Pulse oximetry is a non-invasive method of monitoring a person's oxygen saturation. A pulse oximeter is a fingertip-mounted device that uses light to measure the percentage of saturated hemoglobin in blood, ideally with oxygen. The advantage of pulse oximetry is that low saturations of oxygen can be detected earlier than by clinical indicators such as skin color changes and cyanosis.

The device will display the patient's heart rate (beats per minute), the degree of hemaglobin saturation as a percentage and a waveform of the pulse waves. The evolution of pulse oximeters has resulted in units that are quite accurate, convenient to use, lightweight, non-invasive and inexpensive to purchase.

Pulse oximeters are best used indoors, with patients who have good peripheral blood flow. It is important to remember that the oximeter is measuring hemaglobin saturation, not the quality of patient ventilations. Saturations in the range of 94 to 99% are considered normal. The use of supplemental oxygen should be considered for consistent saturations below 89%, with more aggressive airway management and breathing assistance indicated for saturations consistently below 80%.

Cold hands, nail polished finger nails and low peripheral blood flow will result in false low readings. Exposure to carbon monoxide or cyanide will result in false high readings on the oximeter.

Airway obstructions

There are two classes of airway obstructions:

• mild airway obstructions, and

• severe airway obstructions.

Suction

Suction devices are used to remove fluids and vomit from the airway. Although there are many devices on the market, they share common instructions and precautions for use. Suction is applied only to the oral cavity and upper airway. Insert the tip of the device into the mouth over the tongue. Never place the suction tip beyond where you can see; in other words, no blind suctioning. Apply suction for five to 10 seconds, while the tip is being withdrawn. Ensure that the patient is ventilated and oxygenated between suction attempts.

All suction equipment should be kept clean, and preferably sterile. This can be managed by keeping whatever method of suctioning you elect to use in sealed containers or bags. Once the suction has been used, the non-disposable parts need to be cleaned and decontaminated. This can be accomplished by using a solution of four litres of water to 80 millilitres (one gallon to one-quarter cup) of five per cent bleach solution. The parts should be scrubbed and then soaked for a minimum of 10 minutes. Rinse thoroughly with clean water. Any disposable parts should be double bagged and left in a biohazard waste receptacle at your local hospital or medical facility.

The following are signs and symptoms that would require the use of suction:

• Decreased level of consciousness (LOC),

• Facial injuries involving the mouth or nose,

• Any person whose ventilations are being assisted, or

• Any time an oral airway (OPA) is used.

Prior to using any suction equipment make sure that it functions properly and is complete

Artificial respiration (breathing)

Artificial respiration (AR) refers to respiration simulation where air is provided to a patient who is not breathing or is incapable of breathing on their own.

Lay rescuers and public are not taught AR as part of CPR.

AR must be started immediately in the case of respiratory arrest and at the first signs of lack of oxygen. This occurs when respirations drop below eight to 10 times per minute and continue for a period of time.

There are several methods of AR.

Direct methods involve ventilating the patient's lungs by making a seal between your mouth and the patient's mouth and blowing or by using a mechanical device.

Protect yourself from body fluids by using a pocket face mask or other barrier device, if available. You must be trained and have practiced using them.

Closed chest injuries

Typical closed chest injuries include:

• rib fractures,

• flail chest,

• pneumothorax.

Open chest injuries

In penetration injuries of the chest wall, air can enter the interpleural space from the outside, causing the lung to collapse.

Air moving back and forth through the chest wall results in what is often called a sucking chest wound because of the sucking sound during inspiration.

Important notes

If the chest wall is punctured, air can enter the pleural cavity and the patient can develop a pneumothorax (see Pneumothorax, above).

If open chest injuries are not treated properly, they can result in tension pneumothorax.

Shock

Shock is the medical condition that develops as a result of an imbalance between the delivery of oxygen and the consumption of oxygen at the cellular level. In our everyday lives, the cardiovascular system adjusts to changes in oxygen requirements in various parts of the body and maintains an oxygen equilibrium. These mechanisms of compensation allow blood to be directed to the key organs (heart, lungs, kidneys and brain).

Perfusion is the movement of sufficient oxygenated blood to the cells. Inadequate perfusion or hypoperfusion is the result of a problem in one of the three components of the system getting oxygen-rich blood to cells:

• **Heart:** the pump of the system.

• **Vessels:** the pipes of the system.

• **Blood:** the liquid circulating in the system.

A continuous interaction between these three components maintains blood pressure, circulation, perfusion and the delivery of oxygen to the body.

In the patrolling environment, generally:

• shock as a result of a traumatic event is most likely due to blood loss either internally or externally;

• shock as a result of a non-traumatic event is most likely due to pump failure or compromise;

• shock as a result of sepsis is rarely seen in the field.

Signs and symptoms

Any or all of these signs and symptoms may be present. Note that many of these signs are changes in condition, and not just single observations.

Increased pulse rate:

• The pulse rate increases in an attempt to move more oxygenated blood to the cells.

Increased respiration rate:

• It is an attempt to increase the blood oxygen levels and increase elimination of carbon dioxide (CO_2) via the lungs.

Pale, cool, clammy skin; delayed capillary refill; cool extremities:

• The body attempts to maintain blood flow to the heart, brain, lungs and kidneys by sacrificing blood flow to the digestive organs and the extremities. This is achieved by constricting the arterioles and redistributing blood flow. The result is pale, moist skin,

cool extremities and ultimately absent peripheral pulses.

High anxiety, restlessness and aggression:

• It is due to reduced oxygen supply to the brain. Do not mistake this behaviour for lack of consent.

General weakness, dizziness and nausea:

• It is due to reduced oxygen supply to the brain.

Thirst:

• It is due to an attempt at restoring blood volume. This volume could also be lost through dehydration. Drinking fluids will not restore blood volume. With the shutting down of the digestive organs, the fluids will not be absorbed.

Decreased pulse strength:

• The volume of blood ejected by the heart becomes less. This decrease results in decreased pulse strength. The heart may not be refilling adequately, or it may not be emptying effectively, or there may not be enough blood to maintain the filling pressure.

Drop in blood pressure:

• It may be caused by either a combination of blood loss, loss of peripheral vasoconstriction and/or failure of the cardiac pump.

Decreased level of consciousness:

• It is due to a decrease in blood flow and oxygen supply to the brain

Skull fractures

A simple skull fracture is not easily detectable and is not considered a serious injury in and of itself. However, many severe head injuries are associated with spinal damage and there are a number of associated injuries which can be serious or life-threatening. These may include:

• Linear fracture (a break in the skull that follows a relatively straight line). These can occur at or beyond the point of impact.

• Depressed skull fractures: these injuries cause dents in the skull bone.

• Potential C-spine problems.

• Potential internal head injury.

Signs and symptoms

• Skull fractures may appear as an open or closed fracture, with or without detectable deformity. Examine the skull carefully during the secondary assessment.

• Depressed fractures may result in a portion of the skull pressing into the brain.

• Fractures of the base of the skull frequently result in bleeding from the ears, nose or mouth. Make sure this blood is not a result of laceration of the surrounding skin.

• The clear, straw-coloured fluid which surrounds the brain – cerebrospinal fluid - may leak from the ears or nose as a result of a skull fracture. This type of injury should be suspected if a patient has sustained a severe impact to the jaw.

Treatment

1. Maintain an open airway. Be prepared to administer assisted ventilations if the patient's condition deteriorates. Activate EMS.

2. Administer oxygen if available.

3. Be on the alert for the presence or development of internal head injuries. Together with an internal injury, they are a load and go.

4. Treat as for C-spine injury. Because head injuries are more likely to lead to an unresponsive patient, monitor carefully and be prepared to tilt the backboard to enable fluids to drain from the mouth and throat.

5. Bandage a dressing with enough pressure to stop external bleeding. However, if the skull is no longer

rigid, do not apply pressure. Exercise caution and avoid depressing the fractured area.

6. If there is blood or clear fluid draining from the ears or nose, do not plug these orifices. Allow the fluid to drain. Apply a loose dressing and warn the patient not to blow their nose.

7. Your record keeping can be critically important in the case of head injuries. Inform medical authorities of the following:

• Time and details of the incident.

• Presence or absence of signs and symptoms of spinal disabilities or internal head injury.

• Duration of unresponsiveness, if any.

• Pay particular attention to any change in vital signs and the pupils. Check them every five minutes.

• Blood or fluid appearing from ears, nose or mouth.

Internal head injuries

In increasing order of seriousness:

• Concussion,

• Cerebral contusion,

• Intracranial pressure,

• Intracranial bleeding.

Cervical collar

For an injured person with suspected head and spinal injury, patrollers should initially use spinal manual restriction. In a suspected cervical spine injury, it is recommended to manually support the injured person's head and neck in a position limiting angular movement until more advanced care arrives (e.g. placing one hand on either side of the injured person's head to hold it still). The routine use of cervical collars is not recommended.

NOTE: in special circumstances, traditional immobilization devices may be used for extrication. (Immobilization devices are only to be used with proper training, and if used, the patroller must be under the supervision of a licensed medical doctor). i.e. CSP Medical Advisory Committee.

To apply a collar, the patient must be supine, sitting or standing position, with the head held in a neutral position by another rescuer. The supine/sitting requirement may not happen until the patient is rolled on to the backboard.

To apply the collar, do the following.

1. Tell the patient what you are about to do and ask them not to move. Cervical collars must be tightly fitted. It is normal for the patient to feel discomfort at the points of the jaw.

2. Remove any necklaces (they obscure an x-ray) and if possible any earrings (for patient comfort). Winter clothing and helmets may hinder the proper application of a cervical collar. Always consider the situation, the implications and the prevention of further injury. Should the situation warrant, remove or cut any excess clothing and also remove the helmet

3. Size the collar to the patient. When in doubt, choose the smaller size to avoid hyper-extending the neck.

4. After determining the correct size, assemble the collar according to the manufacturer's instructions.

5. Flex the collar a few times to make it more pliable.

6. Fold the Velcro tab to the inside of the collar to prevent it from becoming contaminated with dirt or snow.

7. Slide the back of the collar under the patient's neck so that the Velcro strap slides completely to the opposite side of the neck.

8. Position the front of the collar beneath the patient's chin.

9. Tighten the collar by gently pulling the strap and fastening it to the side of the collar. The collar should be tight enough to provide adequate support.

10. Do not remove the collar after it has been properly applied. Only qualified medical personnel should remove cervical collars.

11. After application of the collar ensure it is not too tight. Ask the patient:

• Can you breathe?

• Can you speak?

• Can you swallow?

If you have to re-adjust the collar, advise the patient that they will hear the Velcro strap tearing loose and that they should not be alarmed.

12. To the rescuer at the head: ***Don't let go!***

Be aware that even a tightly fitted cervical collar does not completely immobilize the head and neck; it only reduces the extent of motion.

Treat a patient wearing a cervical collar with extreme caution and use the collar as a visual reminder of the criticality involved.

You can let go after the head has been immobilized on the backboard.

Straightening a patient with a spinal injury

You may find a patient with a spinal injury wrapped around a tree, post, mogul or other object which cannot be moved. In such cases, where the patient is probably on their side, the log roll is the preferred method for placing the patient on the backboard. Apply axial immobilization between the head and hips before proceeding to move the patient.

Procedure for standing take-down spinal immobilization

If the patient is standing and a spinal injury is suspected, immobilization can be performed safely while standing. This technique takes three responders. If a bystander is recruited, they should be used to support and control the backboard.

1. Talk to the patient to let them know what will be happening and to reduce their anxiety.

2. Have one patroller size and apply a cervical collar while the other maintains manual in-line stabilization.

3. Place the long spine board behind the person. Check the placement of the board from the front of the person to ensure it is aligned correctly. Check the alignment of the patient's head from the side to ensure the head is in a neutral position. Pad under the head or shoulders as needed to achieve a neutral head position.

4. With one patroller on each side of the injured person and facing in the direction of travel, each should place their arm closest to the patient, under the injured person's armpit and grasp the next highest handhold on the backboard. The responder's free hand supports and holds the patient's head in alignment throughout the lowering. In cooperation with the person maintaining spinal immobilization from the front of the patient, transfer responsibility for C-spine to patrollers at sides. The third responder moves around to the back of the board and holding the top edge, guides the board throughout its arc to the ground.

5. Have the patient hold their arms across their chest. The timing of the move to the ground is set by the person supporting the backboard. Talk to the patient and reassure them throughout the process. Tip the patient backward and lower the person to the ground while holding the head stable. The patrollers will need to move from a standing to a kneeling position during the tip backwards.

6. Once the patient is horizontal and stable, transfer C-spine responsibility to the person at the head and complete the process of securing the patient to the backboard for transport. After the patient is completely immobilized and secured to the board, manual stabilization is released.

Transportation of spinal injuries

Usually, transport spinal injuries with their head downhill.

Transportation speed is dictated by assessment of priority injuries but should be as smooth and controlled as possible.

It may be necessary to place the patient on a tilted backboard to assist in the drainage of fluids (vomitus) from the mouth. Build up padding under one side of the backboard until it is at an approximate 45-degree angle.

Secure the backboard into the toboggan

Types of wounds

• **Abrasion:** the skin, and possibly the tissues immediately below the surface, have been rubbed or scraped. Bleeding is generally easily controlled because only capillaries are affected. The patient may feel a great deal of pain because of the many nerve endings that are damaged and exposed

• **Avulsion:** a flap of skin is torn loose from the body. The flap may either remain hanging or be completely torn off. Avulsions may occur on any part of the body.

• **Laceration:** a break in the skin. A cut. This wound may affect underlying structures depending on the depth. Lacerations may cause significant bleeding if the wall of a blood vessel is broken, particularly an artery.

• **Puncture wounds:** A puncture wound is caused by a stab from a pointed object, such as a nail or ski pole. The opening in the skin may appear small, but the resulting wound could be very deep and could pose a serious infection problem. Internal organs can also be injured by this type of wound.

• **Impaled objects:** An impaled object wound is a puncture wound with an embedded object. The object should be stabilized and left in the wound. Efforts to remove it could cause severe haemorrhage, nerve damage and additional injury to underlying structures.

• **Amputations:** An amputation is the complete or partial severing of an extremity, such as a finger or a toe. It may be caused by a sharp object, such as a knife or wire, or by a squeezing action, such as between a lift cable and drive wheel. Amputations rarely bleed much unless the extremity is torn or crushed. The body's reaction is to vasoconstrict the blood vessels, which reduces haemorrhage in the case of a clean-cut amputation.

Infection

Infection is the growth of foreign bacteria. Any break in the skin carries the risk of infection, especially if it is exposed to foreign agents.

The risk of infection varies with:

• the size of the injury,

• the location of the injury,

• the extent of external contamination, and

• the time between the occurrence of the injury and reaching proper medical aid.

Contamination of the wound with dirt and soil introduces the risk of tetanus. Many other types of bacteria may be introduced. The incidence of infection can be reduced with the application of an antibiotic cream or ointment (if no known allergies to the antibiotic) if the wound is an abrasion or superficial. Cover the wound with a sterile dressing and refer to medical care as appropriate.

Signs and symptoms

Signs and symptoms include:

• Swelling.

• Redness.

• Tenderness.

• Heat.

• Pus which may indicate formation of an abscess.

Treatment

Do the following:

• Leave the wound intact.

• Cover with a sterile dressing.

• Recommend the patient seek further medical aid.

Impaled objects

Do the following:

1. Control haemorrhage by applying pressure around the object but not on the impaled object itself.

2. Stabilize the impaled object with bulky dressings all around the wound site.

3. Unless the object is extremely unwieldy, do not attempt to shorten it. Movement may further damage nerves, blood vessels, and surrounding tissues.

4. Monitor for shock, activate EMS and transport to medical aid.

Fracture types

Closed fractures

Closed fractures are those in which the soft tissue envelope remains intact. They do not result in an open wound, therefore they do not become exposed to the environment and hence represent little danger of infection.

Open fractures

Open fractures are those in which the soft tissue envelope and the skin are breached resulting in an open wound, for example, a puncture wound or a protruding bone. It may also be an abrasion resulting from the fracture.

It is possible that the wound was caused by interaction with the external environment. For example, a puncture from a tree limb or a laceration from a ski caused the fracture. A fractured bone may also have been driven through the soft tissue and skin, causing the wound. In any case, the bone does not need to protrude or have appeared outside the skin for the fracture to be classified as open.

Due to the open nature of the wound, the fracture is exposed to bacteria which could result in an infection. An infected fracture is a serious problem that is difficult to manage. This underlines the importance of initial management of open fractures by first responders.

Fracture management

Definitions for fracture management

For the purpose of this chapter some definitions and principles of trauma will be made in the context of a non-hospital environment where x-rays and advanced diagnostics are not available.

Traction: the use of physical force (usually a pull) on a limb for the purpose of handling a limb from a deformed position to a realigned position in preparation for splinting or transport.

In-line traction: the principle of using a physical force on a limb initially in the direction of the deformity with a goal of decreasing the deformity to a near-normal position. This force is maintained while a splint is applied and may be continued in most lower extremity fractures. It may be released for transport in most upper extremity fractures.

Counter-traction: the force used to stabilize the skeletal frame of the injured person while traction is being used to realign the limb involved.

Maintained in-line traction: for femur fractures and tibia fractures in-line traction may be maintained during transport and appropriate splints designed for this purpose should be used.

Force of traction: varies with the size of the patient, the limb involved, the amount of deformity, the ease or difficulty of realignment and the experience of the first aider.

Realign: the procedure of taking a deformed fracture to a near-anatomical position. This is not the definitive treatment of the fracture but optimizes the tissues' environment and improves the ease of splinting and transport.

Anatomical position: the natural or neutral position of uninjured bones and joints. This position is often depicted as a person in a supine position with arms at their side and legs straight and extended. This is a visual perception in the field and is not an exact position.

Further assessment, imaging and management, including definitive fracture reduction and possible fixation/immobilization will often be necessary in a hospital environment.

General procedure - limb fractures

When encountering a patient with a suspected fracture, a first aider needs an approach to managing the injured limb(s).

1. **Priority assessment:** The initial survey and life-saving measures take priority over fractures. Once an initial survey and life-threatening injuries are dealt with, the manage the fracture(s).

2. **Examine the limb:** Check for breaks in the skin, indicating an open fracture, and the presence of distal circulation and nerve function when and where appropriate. Do a distal pulse, motor and sensation (PMS) check.

3. **Handling the limb:** In-line traction is the best means of handling a limb (deformed or not) to enable proper wound management if an open fracture, and for the application of splints and packaging for transportation. Exercise gentle and slow movement at all times.If there is a significant deformity in the limb, the soft tissues and neurovascular structures may be compromised with the risk of long-term disability. Reducing the deformity of a fracture in the field can significantly reduce the possibility of further damage to the whole soft tissue envelope, including the neurovascular structures, muscles and tendons and the skin envelope itself. There is also a substantial reduction in pain.

4. **Realign the fracture:** For non-deformed fractures, use gentle in-line traction to stabilize the limb for wound management, splinting, and preparation for transport.

• **For a deformed fracture:** After an inspection of the skin and a neurovascular exam are complete, one first aider stabilizes the limb above the fracture site (counter-traction) while another one pulls the limb with appropriate and sufficient force of traction. Realigning the angulation involves two steps. First, one pulls in-line with the deformity. Secondly, the distal limb is then gradually and slowly moved back towards its normal anatomical shape. The amount of force applied depends on the size of the patient, the bone and site involved and the experience of the first aider.

• While maintaining traction, the wound can be managed and a splint can be applied to the limb.

• The goal of the realignment is to restore the shape of the limb which optimizes the environment of the bone and the soft tissue envelope, making it easier to manage the wound and splint the fracture resulting in increased patient comfort for transport.

• Traction may also be used with fractures that have occurred close to joints. In the field, it is impossible to know if a fracture is intra- or extra-articular. A joint fracture, such as a tibial plateau fracture at the top end of the tibia, is best managed by traction to realign the knee and then immobilize. An elbow fracture is the only joint that may be more comfortable to splint in a flexed position, but it is also acceptable to attempt to straighten it to immobilize.

• Sometimes it is not possible to move the limb to its normal anatomical position due to the pain this causes the patient or the inability to move the bones. In that case, splint in a position of comfort

5. **Wound management**: If a wound is open in a winter environment, covering the wound with a sterile gauze dressing is often most practical. If bone ends are protruding from the skin it is best to deliver the bone end back inside the skin envelope. This often occurs during realignment of the fracture with traction but occasionally needs the help of a gloved finger to tuck it in. Despite being contaminated, this is the best environment for the bone and will help prevent infection and loss of blood supply to the bone ends. In a warmer first aid environment, especially if the wound is grossly contaminated, it is best to wash the wound with saline or water and apply a moist saline gauze dressing to help keep the soft tissues viable.

6. **Splinting the fracture**: With the splinting materials and devices available, the principle is to immobilize the fractured bone, including the joint above and below the deformity. Once secured in a splint the manually applied traction is most often gently released for transport.

7. **Maintained traction**: Traction also can be maintained to keep the alignment of the limb, most commonly seen with the femur and tibia. A Sager splint is an example of a splint used to maintain traction for a femur fracture and a Sun Valley splint is an example for a tibia fracture.

8. **Re-examine pulse, motor and sensation**: Once realigned and splinted, if possible, reassess the pulse,

motor and sensation response of the limb. If there is a loss of pulse, motor or sensation either prior to or after splinting a limb the first aider should consider loosening restrictive splinting, but most importantly there is an urgent need to get to advanced medical care, documenting and communicating any perceived loss.

9. **Package for transport**: Appropriately pad and secure the patient for transport.

Strains, sprains and tendon injuries

The bone ends forming a joint are held in position by strong bands of tissue called ligaments. The joints are moved by muscles. The muscles are connected to the bone by tendons.

Splints

Immobilization means any method which holds part, or all, of the body still and prevents movement. This could include:

• fastening a person to a backboard,

• splinting to prevent fractured bone movement, and

• using a pressure bandage to keep injured soft tissue from moving, and so forth.

A splint is a material or a device used to immobilize a suspected fractured bone and the joints above and below the fracture.

Medical Conditions

Upon completion of this chapter the student will be able to:

1. Recognize the signs, symptoms and explain the treatment for the medical conditions found in this chapter:

• Demonstrate the treatment for the conditions found in this chapter

Learning outcome

Recognize, understand, and explain the treatment of common medical conditions.

The patroller is likely to be exposed to a variety of medical conditions, both on and off the ski hill. Many are serious or life-threatening, and the patroller should be ready to intervene and transport rapidly. The most common conditions are discussed in this chapter

Anaphylaxis

Anaphylaxis is caused by a serious and rapid allergic reaction that usually involves more than one part of the body. The reaction can be severe enough to kill. It can be triggered by various things such as asthma or allergies to latex, bee stings, or to certain foods such as nuts, some types of fruit, fish and sometimes spices. Anaphylaxis usually happens quickly.

Asphyxia

Asphyxia is suffocation due to decreased oxygen and increased carbon dioxide in the blood. This causes respiratory arrest. Asphyxia can be due to trauma such as airway problems or blunt trauma to the chest. Non-trauma causes can be drowning, suffocation due to lack of air, or lack of oxygen in the air.

Asthma

Asthma is caused by an acute reactive constriction of the bronchi, and, in the late stages, is caused by the swelling of mucous membranes in the bronchial walls and the plugging of the bronchi by thick mucous secretions. An asthma attack may be brought on by allergic reactions, respiratory infections, emotional stress, cold weather or exercise.

Diabetes

Diabetes is a disorder which affects the body's ability to regulate the level of blood sugar (glucose). Diabetics have an increased risk of heart disease, atherosclerosis of the blood vessels (a buildup of plaque in the inner lining), high blood pressure, stroke, kidney damage, impaired vision, and infections. The complications of diabetes are usually related to the patient's inability to control the blood sugar level by diet, medication, or insulin injections.

Approximately one in 20 Canadians have diabetes.

All body cells require glucose for their functioning. The use of glucose by the cells is controlled by insulin, which is a hormone produced by the pancreas. Insulin allows glucose to move from the blood stream into the cells where it is then used to produce energy.

When the body cannot produce enough insulin, cells are unable to take up and utilise the glucose. On the other hand, if there is too much insulin in the blood stream or not enough glucose, the energy within the cells become depleted, and they begin to malfunction.

Excess amounts of insulin or lack of sugar intake (low blood sugar), leads to rapid onset of hypoglycemia - also called insulin shock. Hypoglycemia results from lack of glucose in the brain. With too much insulin in the blood stream, glucose will move so rapidly out of the blood and into the body cells that there will be insufficient glucose left to maintain normal brain function. The brain is highly dependent on glucose, and permanent brain damage or death can result if immediate emergency care is not provided.

Lack of insulin can cause the blood sugar level to become high, but the cells will not be able to utilise the glucose. This forces the body to use fat as the main energy source, and causes an accumulation of waste product in the blood stream. This condition is called hyperglycemia or diabetic coma.

Hyperglycemia over time can damage many of the organs of the body. To function normally, a diabetic patient should regulate their sugar intake and/or supplement the lack of insulin by the use of a stimulant to increase insulin production (medication), or by the use of external insulin, i.e insulin injection.

The treatment of diabetes consists of appropriate diet, exercise and medication. An imbalance of these factors may lead to either of the two diabetic emergencies described above.

Hypoglycemia (insulin shock) - severe low blood sugar

Hypoglycemia is the most common complication of insulin use. It is extremely dangerous. The signs and symptoms appear quite similar to those of shock. Treatment must be rapid, since the brain cannot tolerate low glucose levels for long. The condition can develop over a period of minutes or hours. Too much insulin circulating in the blood is caused by one or more of the following:

• delayed or missed meals,

• vomiting,

• prolonged exercise without extra food, or insulin adjustment,

• overdose of insulin,

• excessive alcohol ingestion,

• emotional distress, or

• illness.

Hyperglycemia (diabetic coma) - severe high blood sugar

Hyperglycemia is the other serious complication of uncontrolled diabetes; it generally develops slowly, over a period of days. The patient is usually dehydrated and confused, and looks quite different from those in insulin shock (hypoglycemia). Appropriate medical attention is the key to treatment.

Causes of high blood sugar may include:

• missed or insufficient doses of insulin,

• increasing resistance to insulin, possibly as the result of infection,

• inability to take medications and follow diet properly, and

• un-diagnosed diabetes.

Heart attack

A heart attack, also called myocardial infarction or MI, occurs when the circulation to a part of the cardiac muscle becomes impaired, resulting in an inadequate oxygen supply. The cardiac muscle may lose its ability to function effectively.

Prevention research has identified many risk factors for cardiovascular disease. You cannot change some of these factors, such as age, sex or family history. But you

can change your lifestyle to be "heart smart" by making healthy choices. Some of the choices you can make are listed below:

• **Quit smoking** Cigarette smokers are two-to-four times as likely to have a heart attack as non-smokers. Giving up smoking greatly decreases your risk of heart attack.

• **Lower your blood pressure** High blood pressure puts undue strain on all components of the cardiac system. It is possible to lower your blood pressure with proper diet, and regular exercise.

• **Lower your saturated fat levels** High levels of saturated fats in your diet can lead to atherosclerosis (narrowing of the arteries). Moderating your intake of saturated fats can lower this risk factor of heart attack.

• **Weight control and exercise** Controlling your weight and exercising regularly can help lower your stress level and blood pressure. The increased circulation of blood through the heart may increase your chance of surviving a heart attack.

Aspirin administration

Taking ASA (acetylsalicylic acid) within the first four hours of a heart attack can reduce a person's risk of fatality by 25 per cent. ASA works by reducing the tendency of blood platelets to clump and clot, thereby decreasing the possibility of artery blockage.

Time is of the essence in treating heart attacks. Given the environment in which some patients are found, medical help is not always readily available. Aspirin (one of the most common brands of ASA) is one of the most cost-effective ways to treat heart attacks.

Administering Aspirin or an ASA product is **not** permitted if any of the following conditions exist:

1.The patient is already taking blood thinning medication such as warfarin/Coumadin.

2.Sign and symptoms indicate a possible stroke.

3.The patient has a recent history of gastrointestinal bleeding

Administering Aspirin or an ASA product is only permitted when you suspect a myocardial infarction (heart attack) or Angina attack and the five following conditions are present:

The patient is:

• conscious and alert.

• able to provide an accurate medical history.

• able to chew and/or swallow the medication.

• not allergic to Aspirin or ASA products.

• **not** asthmatic.

If all conditions above are met, do the following:

1. Check for MedicAlert identification.

2. Ask questions concerning allergies or chronic respiratory conditions.

3. If available and upon consent of the person, the patroller should assist with administering two 81 mg chewable ASA (Aspirin-Quick Chews) or one regular adult strength (not enteric coated) 325 mg ASA tablet for the patient to chew.

4. Monitor and communicate the patient's response to the medication and any possible complication.

5. Continue to be available to assist the patient with the use of their own medication.

Rescuers may not recommend the use of Aspirin or ASA products in any other circumstance, for example headache, or sprains and strains.

However, rescuers can assist an individual in taking their own medication.

Areas may decide to package children Aspirin with the oxygen and/or trauma packs. Aspirin and ASA products can also be available at area clinics but such storage must adhere to all local and provincial legislation.

The rescuer may also administer ASA that is available from a reliable source.

Hyperventilation

Hyperventilation is the only breathing problem that is not a pre-hospital medical emergency. Hyperventilation often occurs in the wake of highly emotional or stressful situations, or due to pain or nausea. It can also occur for no obvious recognizable reason.

Hyperventilation involves breathing too quickly, to the point that the oxygen and carbon dioxide gases in the blood are altered from their normal balance, bringing on the symptoms discussed below. Treatment is aimed at calming the patient, in order to restore the patient's blood gases to normal.

Frequently this condition occurs in teenagers and young adults - an age group not generally as susceptible to the serious underlying causes of breathing problems as other age groups.

Stroke

A stroke is also known as a cerebral vascular accident (CVA). A stroke is the result of a reduction in the supply of blood to a section of the brain due either to blockage or rupture of the artery supplying the area.

The signs and symptoms depend upon where the brain damage has occurred.

A forerunner and warning sign of possible future stroke is a transient ischemic attack or TIA for short. Signs and symptoms of a TIA are similar to a stroke, but they disappear spontaneously within minutes or hours. The most common are visual disturbances, headache, brief episode of speech disturbances, clumsiness, dizziness and/ or nausea.

Remember F.A.S.T

Facial drooping: A section of the face, usually only on one side, that is drooping and hard to move. This can be recognized by a crooked smile.

Arm weakness: The inability to raise one's arm fully

Speech difficulties: An inability or difficulty to understand or produce speech

Time: If any of the symptoms above are showing, time is of the essence; call the emergency services or go to the hospital.

Cold exposure injuries

Hypothermia

Hypothermia is a serious cold injury which occurs when the body loses more heat than it can produce or retain. The nervous, cardiovascular, respiratory and digestive systems function less efficiently as the core body temperature falls below the normal 37 C. Should the core temperature continue to fall, these functions may cease and death may follow.

Core body temperature refers to that part of the body comprising the brain, heart, lungs, and abdominal organs. There is no good way of measuring core body temperature in the field; the mouth, ear, and armpit temperatures are not accurate because they measure surface temperatures. However, reference to the table on page 17-8 will allow a good estimate of the patient's condition.

Hypothermia does not necessarily occur only in winter. It can occur at any time of the year as a result of inadequate heating, clothing, or nutrition. Hypothermia can be classified into two general categories according to the rate of heat loss:

- Acute, and
- Chronic.

Acute hypothermia

Acute hypothermia may develop over a short period of time as a result of immersion in cold water, or over a period of up to 12 to 24 hours exposure to cool or cold weather conditions.

Cooling rates vary widely in patients exposed to cold weather according to the amount and type of clothing worn, the level of exercise (heat production) maintained, the state of nourishment, and body size. In severe exposure, if the condition is left untreated, death may occur within hours of the onset of the first symptoms of hypothermia.

In the case of cold water immersion, the average patient may remain conscious for up to 1.5 hours in water at 0 C. Sudden death on immersion in cold water is not a result of hypothermia, but of drowning or cardiovascular problems. Cardiovascular problems occur because, in the case of water immersion, the muscles of the larynx will spasm violently to seal off the airway and protect it from further aspiration. This protects the lungs, but will lead to asphyxiation due to lack of oxygen and ultimately cardiac arrest.

Chronic hypothermia

Chronic hypothermia develops over a period of time. This is seen most commonly in the elderly as a result of aging processes, certain diseases, medications taken and inadequate heating in their homes.

As people age, their body circulation system may lose its ability to constrict blood vessels in the skin and extremities in order to reduce heat loss and may also lose the ability to shiver to increase heat production. Subtle changes in behaviour may be the only signs present.

Workplace Hazardous Materials Information System 2015 (WHMIS)

The Workplace Hazardous Materials Information System (WHMIS) is a comprehensive plan for providing information on the safe use of hazardous materials used in Canadian workplaces. It was originally created in 1988 with representatives from government, industry and labour unions to ensure that Canadian workers are aware of the safety and health hazards that may be associated with the materials or chemicals they use every day at work, a right to which they are entitled under law. (see Canada Lab our Code and the Canadian Occupational Safety and Health Regulations (Part X).

Exposure to certain hazardous materials can contribute to, and even cause, many serious health issues such as: organ (kidney, lung, or liver) damage, sterility, cancer, burns, central nervous system damage, and rashes. Some materials are safety hazards on their own and can cause fires or explosions. WHMIS was implemented to reduce and eliminate injuries, illnesses, deaths, medical costs, and fires caused by hazardous materials.

A modified WHMIS, referred to as WHMIS 2015, now incorporates the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). This includes new criteria for hazard classifications and requirement for labels and safety data sheets (SDS). WHMIS 2015 will be implemented over a multi-year transition period to allow for adjustment to the new system.

Implementation and responsibilities

WHMIS 2015 is enforced by the Labour Branch of Human Resources Development Canada for federal workplaces, and by the provincial or territorial agencies responsible for occupational health and safety for most other workplaces. The following link provides a list of the appropriate provincial authorities by province as not all provinces have identical agencies.

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http://www.ccohs.ca/oshanswers/legisl/

http://www.ccohs.ca/products/publications/WHMISafterGHS.pdf

WHMIS 2015 continues to be managed through the implementation of four specific processes:

1. Hazard identification and product classification:

2. Use of specific product labels;

3. Creation of safety data sheets (SDSs); and

4. Education programs for employees and employers.

Employers are required to establish education and training programs for workers exposed to hazardous products in the workplace. Employers must also make sure that the products are labelled appropriately including workplace labels as needed, SDSs are present and available to workers for each product, and ensure appropriate control measures are in place.

Workers are required to participate in the training programs available to them and are additionally responsible for the use of that information to help them work safely with hazardous materials. They should become familiar with any hazardous materials in their workplace, obey all of the prescribed precautions and warning labels. They are also responsible for informing their employers when labels on containers have been accidentally removed or if the label is no longer readable.

Burns

A burn is an injury to the skin, or deeper tissues of the body, caused by contact with heat, radiation or chemicals. The contact causing the burn may be in the form of:

Burns damage the skin or tissues and result in loss of body fluids. This can cause shock. Burns can also lead to infection; so blisters should be kept from breaking and the burns protected with sterile dressings.

• hot solids,

• liquids,

• steam, air or other gases,

• sunlight or ultraviolet light,

• electricity,

• X-rays, radium, or

• chemicals such as strong acids or alkalis.

Ingested poisons

Ingested poisons are poisons introduced into the body orally (swallowed).

Signs and symptoms

Please see "General signs and symptoms" on page 18-2.

Treatment

Do the following:

1. Monitor vital signs,

2. Ensure that the airway, breathing and circulation are maintained.

3. Identify the poison and the amount, if possible.

4. Call the poison control centre.

5. Follow the directions given by the poison control centre.

6. Transport to medical aid.

Induce vomiting only if directed by the poison control centre.

Do not induce vomiting if:

• The patient is unresponsive or convulsing.

• The poison is a known corrosive agent such as:

• acid,

• lye,

• drain cleaner, or

• a poison that contains petroleum distillates such as kerosene, gasoline, oil, lighter fluid, or liquid furniture polish, or

• if it has caused burns to the lips, mouth or throat.

Inhaled poisons

Inhaled poisons are poisons introduced into the body through the respiratory system (breathed in). The most common cases are those of carbon monoxide poisoning.

Signs and symptoms

In addition to the general signs and symptoms of poisoning (see "General signs and symptoms" on page 18-2), other signs and symptoms include:

• respiratory distress,

• coughing,

• pain and burning in the throat;

• pain in the chest, and

• cyanosis.

Treatment

Do the following:

1. Remove the patient from the contaminated atmosphere as quickly as possible with the least amount of risk to yourself and others.

2. Check and monitor vital signs.

3. Ensure that the airway, breathing and circulation are maintained.

4. Initiate artificial respiration/cardiopulmonary resuscitation as necessary.

5. Administer oxygen, if available.

6. Identify the poisoning agent, if possible.

7. Contact the poison control centre and follow their instructions.

8.Transport to medical aid.

If the environment is unsecured (unsafe), do not intervene, call emergency services, such as the fire department, and inform them of the situation.

Injected poisons

Injected poisons are poisons introduced into the body via a break in the skin. See also Insect stings (page 18 - 7) and Snake bites (page 18 - 8).

Signs and symptoms

• confusion,

• disorientation,

• delusions,

• pain,

• tenderness at the site of entry,

• swelling at the site of entry,

• unresponsive, or

• diminished function or failure of the respiratory or circulatory systems.

Absorption (surface contact) poisons

Absorption poisons are introduced into the body through the skin, often with no visible sign of entry.

Some poisons can penetrate the unbroken skin.

Common absorption poisons include:

• pesticides,

• herbicides,

• corrosives,

• acids,

• alkalis, or

• some petroleum distillates.

Signs and symptoms

• nausea,

• sweating,

• skin irritation,

• burns,

• abdominal and substernal tightness,

• abdominal cramps,

• profuse salivation,

• respiratory distress,

• muscle twitching,

• seizures, and

• paralysis.

Insect stings

Stings from insects such as bees, wasps, hornets, ticks and spiders are prevalent particularly during the warmer months and are more common among children.

The body reacts to insect stings on two different levels, local and systemic.

Local response

Most individuals stung by an insect have only a local reaction

Signs and symptoms

• pain,

• redness,

• itching,

• swelling in the form of a raised, firm welt, and

• possible broken skin with bites.

Foreign body in the eye

Check for contact lenses, especially with an unresponsive patient. If found, do not remove the lenses but record their presence to inform hospital personnel.

Only those foreign bodies lying on the surface of the eyeball can be removed safely by the first aider. An unskilled attempt at removing an embedded particle may result in severe damage to the eyeball or in extreme cases, blindness.

Signs and symptoms of an embedded object or a loose foreign body are the same but treatment differs substantially. An embedded object must be referred to medical aid.

Signs and symptoms

• redness of the eyes,

• irritation,

• tearing eyes,

• pain,

• visible presence of a foreign body embedded in, or on, the patient's eyeball. Treatment for a loose foreign body

1. Tell the patient not to rub the eye.

2. Wash your hands thoroughly before examining the eye.

3. To dislodge the particle do the following:

• Have the patient grasp the lashes of the upper lid gently.

• While looking down, the patient should pull the upper lid forward and downward over the lower eyelid. This may dislodge a particle under the upper eyelid sufficiently to be washed away by the tears.

4. If method one above fails, the foreign body must be located first by looking under the lower eyelid:

• Look under the lower lid. With the patient facing a window or a light, place your thumb near the edge of the lower lid and pull downward, while the patient looks up.

• If a foreign body is found, it may be removed with the corner of a clean handkerchief, cotton swab, sterile gauze or folded edge of a fresh tissue.

5. If method two above also fails, the foreign body must be located first by looking under the upper eyelid:

• Prepare a cotton-tip applicator. If none is available, use a wooden match, its tip wrapped with cotton wool.

• With the eye closed, grasp the lashes of the upper lid firmly between the thumb and first finger and pull down and away from the eyeball.

• Instruct the patient to look down.

• Place the applicator across the outer surface of the upper lid about halfway down, and press downward lightly.

• Pull the lid out and up over the applicator. This folds the upper lid back over the applicator, and the inner surface may be clearly seen.

• If a foreign body is present, it may be removed with the corner of a clean handkerchief, cotton swab, sterile gauze or folded edge of a fresh tissue.

6. If the above measures fail, treat as a lacerated eyeball and transport the patient to medical aid immediately. (see "Lacerated eyeball" on page 19-4).

Treatment for an embedded object

Do the following:

1. Tell the patient not to rub the eye. Rubbing scratches the eye membrane and may drive the particle (embedded object) deeper into the tissues, making its removal more difficult.

2. Wash your hands thoroughly before examining the eye.

You may inadvertently transfer dirt

from your hands into the eye.

3. Be gentle and cautious when examining the eye. Eyes are easily damaged.

4. Do not attempt to remove the embedded particle.

5. Cover the eye with a dressing.

6. Transport to medical aid.

Burns of the eye or eyelid

Burns to eyes or eyelids occur as a result of chemical reactions (e.g. contact with acid) or heat (e.g. flame).

Signs and symptoms

• redness,

• charred appearance of the skin,

• severe pain,

• reduced vision.

Treatment of chemical burns

1. Dilute the chemical immediately, by flushing the eye with water or an already prepared or manufactured sterile saline solution.

2. It may be necessary to hold the patient's eyelids open.

3. Flush the eye for at least 20 to 30 minutes. If possible, continue flushing en route, preferably using sterile saline solution.

4. Apply a moist dressing and transport the patient to medical aid immediately.

Treatment for thermal burns

When suffering burns of the face from a fire, a patient's eyes usually close rapidly because of the heat. This reaction is a natural reflex to protect the eyeballs. However, the eyelids remain exposed and are frequently burned.

The treatment of burned lids requires specialized care, therefore apply moistened sterile dressing and transport the patient to medical aid immediately.

Lacerated eyelid

Lacerations to the eyelid often occur in conjunction with serious injuries to the face or eyeball (see Lacerated eyeball, below).

Signs and symptoms

• profuse bleeding due to the rich blood supply.

Treatment

1. Apply pressure directed upwards against the forehead.

2. Do not apply direct pressure to the eyeball.

3. Transport the patient to medical aid immediately.

Lacerated eyeball

Lacerations to the eyeball may occur either as a single injury, or along with multiple injury sites such as broken bones.

This can be a very serious injury if fluid is lost from the inside of the eyeball. Ensure that the patient is transported comfortably and that nothing increases the pressure on the eyeball, for example, sudden movement, coughing, or tight dressings.

Signs and symptoms

Signs and symptoms include pain at and around the site of the wound, bleeding, or the presence of tearing in the eye.

Treatment

Do the following:

1. Do not exert pressure on a lacerated eyeball. This could force fluid out of the eyeball.

2. Do not remove a protruding foreign body from the eye.

3. Pad around the eye and cover with a dressing.

4. Transport the patient to medical aid immediately.
Solar keratitis

Overexposure to the sun's ultraviolet (UV) rays can burn eye lids and the cells on the eye's surface, which can lead to searing pain and the feeling of having sand in the eyes.

Prevention

Prevention is the best method of treatment. Wear dark glasses or sun goggles. Improvise goggles with a cardboard disk or leather. Slit the cardboard or leather in the form of a T (one for each eye) and place over the eyes.

Signs and symptoms

• blurred vision,

• irritation

• burning sensation increasing to intense pain,

• redness of the eyes,

• eyelid twitching,

• swelling,

• sensitivity to light,

• tearing eyes,

• temporary vision loss (called photokeratitis, or snow blindness).

Similar signs and symptoms can be experienced or exacerbated when an irritating substance like sunscreen and sweat get transferred into the eyes. These substances can temporarily irritate the delicate membrane over the eyeballs, making them sting or burn.

The treatment for sunburned eyes and foreign substances like sunscreen or sweat in the eyes is the same.

Treatment

Do the following:

1. Move patient to a shaded, cool location (seated).

2. Check if patient is wearing contacts and remove them. If unable to remove a contact, flush the eye with the contact in.

3. Assist patient to hold the eye lid open and flush eye with saline or commercially available eyewash solutions. In lieu of saline, use cool water and continue with treatment as outlined. Flush the eye from the inner corner toward the outer corner. This prevents a substance in the eye from washing into the other eye.

4. Monitor patient. The treatment may have to be repeated several times.

5. Use a light, cool compress or ice towel to reduce the pain. If a small ice pack is used, place a wet cloth (single layer) between the ice and the skin. Do not use chemical cooling packs on the eyes.

6. After flushing the eye, encourage the patient to wear dark glasses or cover the eye with a sterile bandage or cloth. Keeping the eye closed may help reduce pain.

7. If the pain is still not controlled, send to medical care.

Childbirth

First aid for childbirth (or, more accurately, assistance with childbirth), requires common sense and professionalism on the part of the patroller.

Critical incident stress

Patrollers possess many of the same characteristics as other fellow emergency workers.

These traits include:

These traits allow patrollers to work effectively in the emergency setting.

During the process of assisting patients, it is natural to have emotional feelings. However, when the emotional reaction is so powerful as to overcome or severely impair your ability to think and act, you experience a personal "critical incident."

- A need to be in control.
- A strong desire to do a perfect job.
- Compulsive, tend to repeat the same actions in very similar events.
- Highly-motivated by internal factors.
- Action-oriented.
- High need for immediate gratification.
- Easily bored.
- Risk takers.
- Strong need to be needed.
- Strong sense of dedication.

Anatomy and physiology of the pediatric patient

A child's body grows and develops into their adult form by approximately eight years of age. The tongue is proportionately larger than an adult in comparison to the size of the mouth. The tongue is the most common cause of airway obstruction, especially when the neonate is supine.

Communication with a child

It is very traumatic to a child to sustain an injury and go through the process of assessment, treatment and transport by the ski patrol, or any other emergency medical personnel. This experience will become a part of this child's life and will most likely be remembered for a long time. Your interaction with a child patient sets the tone for all other emergency workers who may have to take care of him or her. It is important to communicate with the child, and the parents, in a calm and professional manner. Both parents and children will have concerns over their situation; they should be given as much information as possible and each procedure should be explained to them briefly before proceeding.

Remember that you are a stranger and children are not supposed to talk to strangers. Introduce yourself as a good stranger, like a policeman or a doctor. Let them know that you are there to help them and that you will explain and let them know what you're doing before attempting any procedures or using any equipment on them. This is particularly important as some pieces of equipment can appear very intimidating to a child. For example, being in a toboggan pulled by a snowmobile can be terrifying for a child. If it is possible at all, have the parent ski beside the child and keep talking to them. If the child is not immobilized on a board and there is room, you may be able to put the parent in the toboggan with a small child. Parents and children have fears about pain and worry greatly anticipating it. The fear of loss goes both directions, depending on the age of the child, as both worry about losing each other. It is sometimes impossible to keep a parent and child together. If this is the case, let them both know exactly what is going to happen and when they will be reunited. One of the hardest situations is when a child needs to be flown out by helicopter and there is only room for the child. The parents must then get in the car and drive to the hospital. Make sure they are given specific directions and have someone else drive, if at all possible. Give the conscious child something that will remind him or her of their parents, such as a T-shirt or sweater that has been worn by the parent. This will calm them. Let the child know that they will be reunited with their parents when they get to the hospital.

Children are often literal thinkers. If you "take their blood pressure," will you give it back? The following story shows how we need to think before we speak and ask before we do things:

A little girl named Liz who was suffering from a rare and serious disease. Her only chance of recovery appeared to be a blood transfusion from her five-year old brother, who had miraculously survived the same disease and had developed the antibodies needed to combat the illness. The doctor explained the situation to her little brother, and asked the little boy if he would be willing to give his blood to his sister. He hesitated for only a moment before taking a deep breath and saying, "Yes, I'll do it if it will save her." As the transfusion progressed, he lay in bed next to his sister and smiled. Then his face grew pale and his smile faded. He looked up at the doctor and asked with a trembling voice, "Will I start to die right away?" Being young, the little boy had misunderstood the doctor; he thought he was going to have to give his sister all of his blood in order to save her. Each age group will require a slightly different approach to communicating with them.

Manually transporting the patient

There are several methods of transporting a patient solely or with the help of others.

The basic techniques include:

- the human crutch (page 21-2),
- fore-and-aft carry (page 21-2),
- two-handed seat (page 21-2),
- three-handed seat (page 21-3), and
- four-handed seat (page 21-4),
- chair carry (page 21-4), and
- drag carry (page 21-5).

Vocabulary (Back of Manual)