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# Chapter 1

## Preparing to Respond

This St. Mark James manual on first aid & CPR will teach you how to deliver first aid and create safe environments both in your personal life and in the workplace.

First aid is defined as the immediate care provided to an ill or injured person before more advanced care is available. First aid is an important set of skills for what to do in emergency situations



After learning first aid, you will be able to recognize a medical emergency and help those in need.

### The First Aider's Role

The role of a trained first aider is to:

- Recognize emergencies.
- Call emergency services (EMS or 911).
- Act according to your skills, knowledge and comfort level.
- Know the worksite's emergency response plan (if at your workplace)
- Know your role as a first aider at the worksite

A workplace first aider is a worker with a first aid certificate that is current and recognized as defined by legal requirements. The role of a workplace first aider is to provide emergency care to an injured/ill worker in the workplace.

Because fire, ambulance, and police can take time to arrive at the scene of an emergency, a first aider can lend valuable assistance.

### Recognizing an Emergency

In order to respond to an emergency, the first skill is being able to recognize one. A serious illness or injury constitutes an emergency situation.

- A medical emergency, such as a heart attack, is a condition which requires immediate medical attention. Other examples of serious medical emergencies include breathing difficulties and cardiovascular emergencies such as heart attacks and stroke.
- An injury includes damage to the body caused by external force. Broken bones, burns, and wounds are examples of such damage. Injuries can result from vehicle collisions, sports and falls. If you are uncertain whether an injury is serious enough to qualify as an emergency, call EMS/911 and allow trained professionals to determine the severity.
- In a situation where you are not sure (a vehicle accident or industrial incident or explosion) it is always better to be safe than sorry and always contact EMS.

## Prepare - Stay Safe – Survive

- **Prepare** – Preparation includes what you should do before you enter a first aid situation. This includes taking a first aid course as well as keeping your training up to date. This also includes carrying first aid kits or appropriate supplies (i.e. blankets, radio, etc.) with you.
- **Stay Safe** - Stay safe pertains to your behavior during an activity. This includes following the appropriate procedures and practices and wearing recommended safety equipment.
- **Survive** – You should take actions to ensure the safety and survival of both yourself and others. This includes identifying and reporting hazards at work, in the home, or in the community.

## Action

The most important behavior of a first aider is to take action. Your recognition and response to an emergency can save lives. An action can be phoning for help, comforting the injured or their family, providing first aid, or helping to manage the scene. Other jobs at the scene of an incident include monitoring the casualty's valuables, interviewing bystanders or controlling traffic. You do not need to have the highest training to help but the confidence and will to help is just as important.

## Barriers to Action

- **Doing something wrong** – Some people hesitate to provide first aid out of fear of doing something wrong or even getting sued as a result of providing aid. Fortunately, laws exist to protect bystanders who provide emergency assistance as long as you act reasonably. These laws in Canada include the Good Samaritan Act as well as the Emergency Medical Aid Act. This manual will go over these laws in more detail later on.
- **Unpleasantness** – It is possible that you may feel sick or upset during or after providing aid to an injury or illness. Emergency situations can involve blood, broken bones, vomit and other unpleasant sights and sounds. Try taking a deep breath in these situations and remember you will be no help to the injured person if you also become ill. If you need to, flag someone else down to help, or call EMS/911 and remain in the area until they arrive.
- **Catching a disease** – Some people do not act or provide aid because they are concerned of contracting a disease or an illness. Certain steps can be taken to minimize this risk such as wearing gloves and washing your hands. This manual will go into more detail to help you understand and prepare.
- **Other people** – Never assume that someone else is taking action and providing first aid even when there are several people at the scene. There are many actions that you can take in these situations. These actions can include calling 911, controlling the crowd, or getting supplies.
- **The ill or injured person** – Some people may feel uneasy in assisting people that are behaving abnormally. In addition, some may hesitate to assist because of gender, race, or age.



Figure 1: Don't be afraid to act during an emergency. Do not be afraid to contact EMS if you are not sure if the situation is an emergency.

Remember, first aid can be as basic as calling 911 and remaining with the ill or injured person until EMS arrives.

## First Aid and the Law

There are laws to protect those that provide reasonable and appropriate care. Being familiar with these laws can help you know what you can and can't do as a first aider.

## Legal Protection

The **Good Samaritan Act** and the **Emergency Medical Aid Act** encourage bystanders to take action and deliver adequate first aid. You cannot be held responsible for aggravating an injury if you behave reasonably and within your skill level. However, for this protection, you must meet the following conditions:

- Always identify yourself as a first aider before physically touching the victim.
- If the victim is conscious – ask permission to help them. If they do not give permission then you cannot force help.
- If the victim is unconscious – you may help them as unconsciousness implies consent.
- Your assistance must be voluntary.
- You must provide assistance within your level of training. Do not do something you saw on TV because you saw it 'worked.'
- Once you begin first aid you must continue until someone with equal or more advanced training takes over (more on this below).

## Obligations

If anyone is in your care, you are legally obliged to provide assistance and provide first aid if it is required. Someone in your care could be a child, or someone who is not mentally able to make their own decisions.

- When a child is not in your care, you are not legally obligated to assist, but it is recommended that you maintain your intention to act regardless of the person requiring attention.
- If a parent or guardian prevents you from assisting, call EMS/ 911. Convey that the parent or guardian has refused your assistance and they will deal with the situation upon arrival.
- You do not need a child's permission to help or provide aid.

If you are the designated first aider at your work place, you may also be obligated to help. Knowing the rules at your work place is your responsibility.

## Emergency Preparation

There are a variety of steps you can take to ensure you are prepared to assist or provide first aid to those in need. First aid training will provide you with knowledge, skills and the confidence to act. Your preparation and confidence ensures an ill or injured person receives assistance when it is needed.

Other specific actions you can take in advance include:

- Have up-to-date training in first aid and CPR. If you don't use it you will lose it!
- Keep an up-to-date and well stocked first aid kit at work, in your car and in your home.
- Post emergency numbers near telephones at work and in your home.
- Create an emergency plan and practice it with co-workers and children.
- Ensure all emergency equipment is functional and up to date.

## After an Emergency

Debriefing an emergency situation after it is over can be helpful and healthy. If you feel affected do not hesitate to contact a professional who is trained in crisis management. You can also provide support to others who were involved in the emergency by speaking with and comforting them. In the workplace, complete the appropriate forms after an emergency event. Note that debriefing these experiences serves as preparation for future emergencies and helps you manage them more effectively.

## Disaster Preparation

Although rare, disasters can happen anywhere. Preparation begins with identifying the possible disasters which could affect the home, the workplace, or recreational settings. Some recommendations to aid in such preparation include:

- Pick two meeting places to use in case of a fire. One should be near your home, or workplace and the other should be an area outside of this neighborhood in case you cannot return after the event.
- Keep important records inside a fire and waterproof container.
- Have emergency supplies available in the home, workplace, recreational facility, and in your car.

- Talk to your family and co-workers about the dangers of extreme weather, fire, and other disasters which are possible in your area. Identify how you want to respond in each situation.
- Have an emergency supply kit available in your home. This kit should prepare you and your family for 72 hours. Include food (non-perishable), water, light sources, battery powered radio, batteries, first aid kit, toiletries, specific items for young and old people in your care, pet food, medication, warm clothes or blankets, and important documents. Check all contents every 6 months to ensure they are not expired.
- Ensure that you have some spare money, glasses, medications, car keys and batteries. Only use your phones (mobile and landlines) to call EMS/911. Otherwise ensure your lines are not in use (otherwise they take up one line). City networks are limited and must be preserved for medical emergencies only. If you need to contact family and friends try to text or use social media.

## After a Disaster

- Stay away from unsafe areas.
- Do not use the telephone unless it is to call EMS/911.
- If you have been separated from your family, children under your care or co-workers then register with local authorities.
- In the event of evacuation, wear sturdy shoes and weather appropriate clothing that will keep you comfortable, warm and dry. Bring an emergency kit with you and lock the building when you leave unless otherwise advised or in case of fire.
- Keep informed by listening to the local news stations.

## Mental Health Awareness

If you are ever concerned for someone's mental health, or your own, please seek medical attention by calling 9-1-1. After an emergency there are many factors that can play apart in our state of mental health. It could be any of the following:

- Critical incident or traumatic event (current or post)
- Person may have cognitive impairment such as dementia or memory loss
- Person may have a mood or psychiatric disorder such as (depression, anxiety or bipolar)

By calling for help you are getting medically trained professionals to react fast and efficiently. This is our best course of action as we do not diagnose any medical condition as a first aider.

## Occupational Stress Injury

Occupational stress is range of negative health effects caused by one's job. It can be related to workload, roles and responsibilities, long hours, and even toxic work environments. It becomes an injury when ones stressors reach a point where the person can no longer cope and it becomes a crisis.

### Signs and Symptoms

- Inability to sleep
- Irritability, anger, and/or aggressive behavior
- Isolation from co-workers
- Lack of interest in work

### Treatment for occupational stress injuries (OSI)

The best course of action would be prevention in a perfect world. However life gets away from us at times. You can do any of the following to help with OSI:

- Use personal/mental health days
- Leave work at work – don't bring it home to your family and friends
- Set aside time for yourself (do something you're interested in for 15 min daily)
- Talk to friends and family about work struggles
- Healthy lifestyle – eat well, exercise and get enough sleep
- Consult a medical / mental health professional (Family Physician/Counsellor)

If you recognize yourself or co-worker are showing signs of OSI engage the help of Human Resources and other government agencies if needed.

### Mental Health Resources and Crisis Help

- 9-1-1 or 2-1-1; (2-1-1 may not be available in your area check your local directory)
- Mental Health Line (Alberta Wide) 1-877-303-2642 (Toll free)
- Employee Assistance Programs (if available through work)



- Kids Help Phone 1-800-668-6868
- Rural Distress Line 1-800-232-7288
- Mental Health First Aid (2 Day course) - <https://www.mhfa.ca/>
- There are many types of Mental Health Crisis

## Mental Health Issues

- Depression
  - Symptoms can include: lack of motivation and concentration – feeling tired or lethargic – withdrawing from typical life events (work, friends, etc.) – guilt or hopelessness – changes in sleep, eating and weight
  - Calmly talk with the person – attempt to redirect the patients thinking away from triggers – depressed people can be at risk of suicide and all disclosures must be taken seriously – offer to refer the person to mental health professionals
- Anxiety / Panic Attack
  - Symptoms can include: fear and apprehension – changes in breathing and heart rate – feelings of terror that strike suddenly and repeatedly – dizziness – sweating – nausea – weak or faint
  - Speak calmly and reassuringly to the person – help and encourage them to control their breathing (slow and deep breaths) – take a medical history to rule out other issues – if necessary remove person from trigger
- Psychosis
  - Symptoms can include: hallucinations – mania – confusion or disconnected thoughts – suicidal ideation – false beliefs – altered perception of reality – aggression
  - Attempt to talk with the person – never dismiss or ignore their perceptions (even if it does not make sense) – Speak calmly – If any potential harm or violence call for police and mental health
- Suicidal Thoughts or Actions
  - Symptoms can include: depression or severe anxiety – psychosis may also lead to suicide – warnings may also include expressing final wishes or giving away possessions
  - Any and all suicidal thoughts or expressions should be referred to mental health professionals regardless of the situation – do not leave the person alone – listen and perform steps for depression

## About Infection

Infections occur when germs invade the body. There are four things that contribute to an infection:

- Germs are present in the environment around you.
- These germs enter your body.
- Your immune system isn't strong enough to combat the germs.
- There are enough germs in your body to cause an infection.

All of these must occur for you to get an infection. If one is missing, you will not become infected.

There are several ways different infections can be spread from one person to another:

- Direct contact – touching the blood or other body fluid of someone who is infected.
- Indirect contact – touching something an infected person has touched.
- Airborne transmission – an infected person sneezes or coughs, sending germs into the air.
- Vector-borne transmission – a mosquito bites an infected person and then bites you, passing along the germs.



Figure 2: Washing your hands with soap can prevent infection and disease from

## Preventing the Transmission of Disease

Certain steps can be taken to stop the infections and diseases from spreading. These include:

- Using soap when you wash your hands (figure 2). Hot water alone will not kill the germs.
- Wash equipment by wiping down any surfaces contaminated with a 10% bleach solution (or other disinfecting solutions)
- Wash bedding at least once a week. Wash them daily when children are sick.
- In a child-care setting, protect children from infectious diseases by:
  - Encouraging parents to keep sick children at home.
  - Insisting that workers / employees that are sick not come into work.
  - Have a separate room for children who become ill.
  - Have children wash their hands frequently

- Washing your hands thoroughly before and after taking care of an ill child.

### **Direct and Indirect Contact**

- Avoid touching or coming into contact with bodily fluids by always using effective barrier devices, like gloves. Always assume everyone else's bodily fluids are contagious.
- Use a barrier device, such as a pocket mask with a one-way valve, when conducting CPR.
- Always be careful when handling potentially contaminated objects.
- Wash your hands thoroughly using soap and water.

### **Airborne Transmission**

- Teach children and others the importance of covering their mouths when they cough or sneeze. Encourage a sneezing / coughing individual to use their arm over their hands whenever they can. Encourage hand-washing afterwards.

### **Vector-borne Transmission**

- Wear protective clothing and use insect repellent when there is a risk of insect bites.
- Follow safety protocols when using sharp objects including disposing them in the proper sharp object containers.

## **The Importance of Hand Washing**

Hand washing is one of the most important actions you can take to prevent the spread of germs that can lead to infection.

### **When to Wash Your Hands**

As a first aider you should wash your hands before and after activities such as:

- Changing a diaper.
- Going on personal breaks.
- Handling or eating food.
- Using the bathroom.
- Handling pets and/or cleaning animal cages.
- Blowing or wiping noses.

- Attending to a sick child.
- Managing an open wound.

Children should wash their hands before and after:

- Eating or handling food.
- Playing with toys.
- Playing in water or sand.

Children should wash their hands after:

- Using the toilet.
- Playing with pets or animals.
- Being touched by a child who may be ill.

## **Steps for Effective Hand Washing**

- Wet your hands using warm water.
- Apply soap and lather hands for 20 seconds, ensuring you get between your fingers and the backs of your hands.
- Rinse your hands for 10 seconds ensuring you remove all the soap.
- Dry your hands with a disposable towel then use the towel to turn off the tap and open the bathroom door.

## Removing Disposable Gloves

When taking off gloves (Figure 3), make sure the outside of the glove doesn't touch your skin. Always wash your hands after removing the gloves.

If you tear your gloves while providing aid, take them off immediately. Wash your hands or use hand sanitizer, if possible, and put on a new pair of gloves. Used gloves should be disposed of in a sealed plastic bag and placed in a biohazardous bag, if available, or in a garbage bag.

Any contaminated personal protective equipment (PPE) should be discarded in a safe manner. For disposable materials, biohazardous bags are often available in first aid kits and are the best method of disposal of all PPE. Ambulances have a container to store contaminated PPE and, if asked will assist in its removal. If unavailable, place contaminated PPE into a plastic bag and then dispose of in the garbage, or as instructed by medical professionals. Any contaminated, but reusable PPE/equipment must be carefully and thoroughly washed and decontaminated before use. Alcohol, antiseptics, and professional cleaning chemicals are recommended with appropriate SDS and PPE.

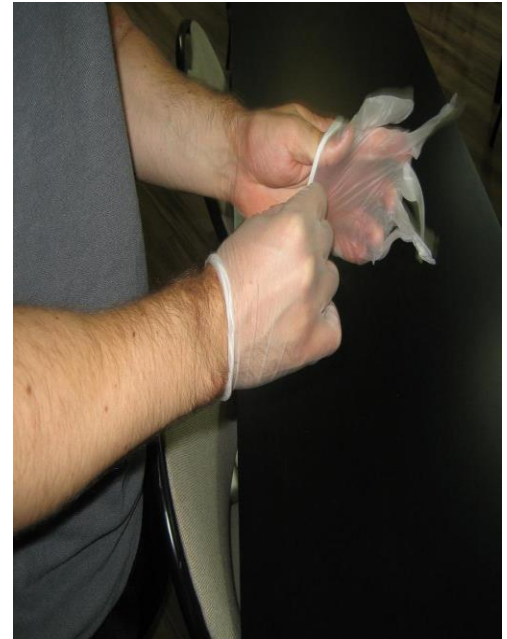


Figure 3: When removing gloves ensure that the outside of the gloves does not touch your skin.

## Immunization

Immunization protects you against acquiring common diseases by introducing a substance to your body that builds up your resistance to them. While children are usually required to be immunized for school, not all adults get immunized. If you are unsure of the immunizations you have received, talk to your doctor.

## Chapter 2

### Emergency Medical Services

The Emergency Medical Services (EMS) is a service dedicated to providing the highest level of medical care outside of the hospital. This includes the transport of people or patients to care facilities that have illnesses or injuries. The EMS system varies from community to community. However, the general system and principles of EMS are the same in each province and territory.

Generally, EMS services should be called in all situations where the patient appears unwell, or the medical issues are beyond the scope of basic first aid training. It is better to exercise caution in first aid situations, if you are ever unsure, it's better to call 911.

#### When to Call EMS/911

If you believe an emergency exists, you should call immediately. It is better for professionals to determine whether they are needed than to not come when they *are* needed. Here are some guidelines for calling EMS/911:

- If there is danger to you or others.
- When a victim is unconscious or has altered level of consciousness.
- When there is difficulty breathing or no signs of breathing.
- Persistent chest pain or pressure.
- Seizures, headaches, or slurred speech.
- Life threatening (deadly) bleeding.
- Blood in vomit, urine, or stool.
- Suspected broken bones.
- Injuries to head and/or spine.

Never hesitate to call EMS/911 if the situation involves:

- A fire or explosion.
- Swift-moving water.
- Live electrical wires.
- A motor vehicle collision.

- A situation where you cannot access the person easily.

## When to Call Parents or Guardians

If it is an emergency situation, always call EMS/911 before calling the parents. However, if a child is in your care, you also need to inform the parents. Call the parents or guardians when you observe the following:

- Vomiting.
- Diarrhea.
- Fever.
- Any injury to the body (for minor cuts, you do not need to call the parents but they need to be made aware of injury when they are being picked up).
- Loss of, or decrease in, appetite.
- Child doesn't play as normal or shows abnormal behavior.

## How to Call EMS/911

- In advance, be sure emergency numbers are available near every telephone in your home, office, recreational facility, or child-care centre. While many areas have a 911 number, some may use a local number.
- When you call EMS/911:
  - You will need to provide details about the emergency. Dispatchers will ask you the following questions:
    - The specific location of the emergency.
    - The telephone number from which the call is being made.
    - Your name.
    - How many people are involved.
    - The condition of the people involved.
    - Treatment being given to the person.
  - A decision will be made about the response. The dispatcher may send firefighters, police, ambulance personnel or a combination of the three.
  - Do not hang up until the dispatcher tells you to.
- If you are involved in providing first aid, designate a bystander to call EMS/911. Point to and describe the person you want to make the call. For example, "You in the blue baseball hat

and black shorts, can you call 911? Tell them we have an unconscious woman. Do you understand? Tell me when you have called!" Tell the selected bystander to return to you and confirm that they have made the call to EMS.

When the ambulance arrives do not stop providing aid to your casualty/casualties. The emergency crew will take over and when they do you can stop. Give them a short report of what happened, how your casualty is doing and what you have done for treatment. This also applies if you are handing control of the scene to someone else that is not the casualty.

## COMMUNICATION

In every situation we need to communicate. As a first aider you may be faced with communicating with more than one person at any given time. First aiders may have to communicate with – emergency personnel, the casualty, friends/family, and bystanders. Effective communication starts with the first aider the following are some tips to help with that

- Stay calm
- Be direct and respectful
- Do not use medical terms
- Keep it simple and be honest, while choosing your words carefully

## PRINCIPLES OF EFFECTIVE COMMUNICATION

- **Body language** – have an open posture and be relaxed
- **Focus** – get to eye level and concentrate on your casualty
- **Terminology** – use simple words and be clearing
- **Professionalism** – always talk to your casualty with anything you are doing. Let them know why and if it could be painful give them warning.

## BARRIERS TO EFFECTIVE COMMUNICATION

Sometimes there are things out of our control that can make helping someone more difficult such as

- **Language** – the first aider and the casualty may speak different languages
- **Culture** – different cultures interact with others differently which may impact communication
- **Physical** – the casualty may have a speech, hearing or visual impairment



- **Cognitive** – the casualty may not understand the questions, or may not be able to tell you it hurts
- **Technical** – communication devices may be impacted (i.e. – phones/radios)
- **Environmental** – noise and weather can change any situation

As a first aider if you are faced with any of the above challenges, you may need to use many forms of communication to get the information needed.

### Things to Remember with a Child in your Care

- Call another caregiver or trusted neighbor to come and stay with any children in your care if you need to leave for an emergency.
- Call the ill or injured child's parents or guardians. Ask them to meet you at the hospital. Tell them you will call once more when you know the name and location of the hospital.

## Chapter 3

### Emergency Scene Management

Emergency situations can take many forms and occur in several different environments. In order to be prepared for the challenges of any situation, first aiders utilize an Emergency Scene Management (ESM) protocol. Emergency Scene Management includes four steps; Scene Survey, Primary Survey, Secondary Survey, and Ongoing/Continual Care.

#### Scene Survey

The first step in ESM is the Scene Survey. Following the steps below will help you make prompt, accurate decisions and give the best care possible to the casualty.

- Ensure the scene is safe and free of hazards. A hazard is defined as a potential source of harm to a worker/person. If it is not safe, do not enter the scene. Find a safe place and call 911. Your safety is the number one priority. Things that might have hurt the casualty might also hurt you so it is important to stay safe. Hazards can be anything that affect your own or your injured person's safety, and can change throughout an emergency.
- Determine Mechanism of Injury (MOI) – this refers to the circumstance in which an injury occurs. What is the likely cause of the injury? Was the person in a serious crash or in a minor fender bender?
- Take charge of the scene.
- Check for responsiveness by introducing yourself and obtaining consent. If there is no response, try to tap their shoulders. Do not shake the casualty.
- Ask a bystander to call EMS/911 if required and get an AED, if available.

## Primary Survey

The primary survey is the first step in assessing the casualty for life-threatening conditions. Here you quickly check for the following priorities of first aid:

- **Assess the patient's mental status / Level of Consciousness (LOC) – AVPU**
- **C-Spine** – check if head or neck stabilization is required
- **Airway** – is it open and clear?
- **Breathing** – is breathing effective and normal?
- **Circulation** – is circulation effective?

The primary survey should always be conducted on each casualty. In scenarios with multiple casualties, victims that have an incomplete primary survey take priority. The following are the steps to completing the primary survey.

### Assess the Patient's Mental Status / Level of Consciousness

Determine the casualty's level of consciousness. Is the casualty responsive or unresponsive? Use the following **AVPU scale** to determine the casualty's mental status:

#### A – Alert

Is the casualty alert, oriented, responsive and talking with you? If yes, the casualty's mental status is Alert.

#### V – Verbal

Does the casualty appear to be unresponsive at first but responds to loud verbal stimulus from you? Ask simple questions such as "What happened?" and "What's your name?"). If the casualty responds in any way, including with a grunt, groan or a simple look at you, the casualty's mental status is Verbal or responds to verbal stimuli.

## **P- Painful**

If the casualty doesn't respond to verbal stimulus but responds to painful stimulus, such as a pinch to the skin or the rubbing of a knuckle against the sternum, the casualty's mental state is painful or unconscious and reacts to pain.

## **U – Unresponsive**

If the casualty does not respond to either painful or verbal stimuli the casualty's mental status is unresponsive or unconscious and doesn't react.

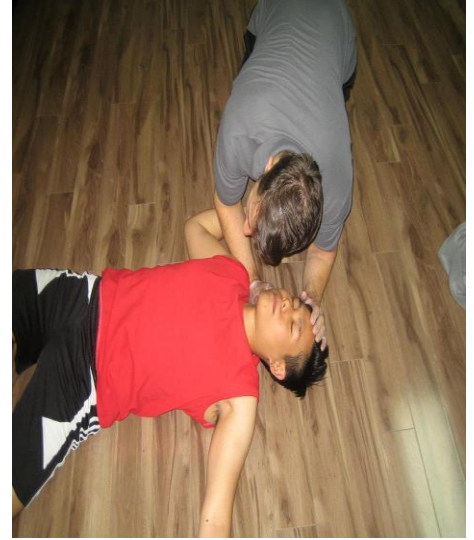


Figure 4: The head-tilt chin-lift maneuver is used to open the airway.

## **Spinal Motion Restriction – C-Spine**

Establish the need for cervical spinal stabilization

- Canadian C-spine rules recommend stabilization if any of the following apply
  - Over 65 years of age
  - Dangerous mechanism of injury? (eg. MVC, fall >3feet, Ejection/Rollover, etc.)
  - Patient states numbness or tingling in extremities, or pain in head or neck
  - Decreasing/lower level of consciousness
  - Unable to move or rotate head without pain or assistance
- If any of the above apply it is best to exercise caution, call EMS/911 and establish C-spine control

## **Primary Survey**

### **A – Check the Airway**

*If responsive:*

Ask "What happened?" If the casualty responds, you know the airway is clear.

***If Unconscious and Unresponsive:***

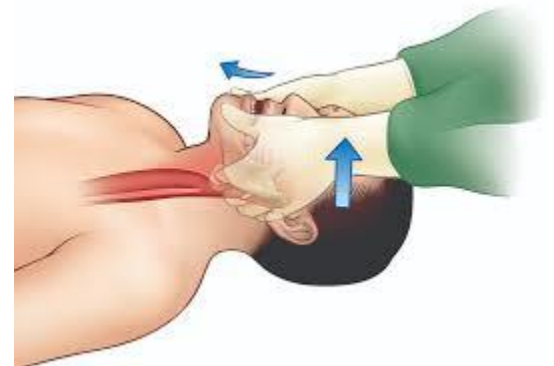
Use the head-tilt chin-lift maneuver (Figure 4) to open the airway and to pull the tongue off the back of the throat.

## **B – Check for Breathing**

Keep the airway open. Look for chest rise, listen for normal breathing sounds and feel for breath on your ear. Do this for at least 5 seconds and no more than 10 seconds.

- Effective breathing - If breathing is effective, go on to check circulation.
- Absent breathing - Begin CPR and get an AED, if available.
- Agonal breathing - This is defined as an occasional gasp for air. This is not normal breathing. In this case, treat the person as though they are not breathing and begin CPR.

NOTE: If the MOI suggest the need for C-spine (spinal motion restriction) the first aid attendant should perform a jaw thrust (C/E Clamp) to reduce the risk of further aggravating the neck injury.



## **C – Check Circulation**

Circulation only needs to be checked if the person is breathing. If they are not breathing, assume there is no circulation and begin CPR.

- Check skin color, temperature and condition.
- Control severe bleeding using pressure (be sure to use gloves)

Once the primary survey is complete and all life-threatening conditions have been managed (including airway, breathing and circulation as well as contacting EMS) first aiders should move on to the secondary survey.

## **Secondary Survey**

The purpose of the Secondary Survey is to perform a more detailed and thorough examination to identify illnesses and injuries as well as gather additional information beyond what is obtained during the Primary Survey. Other rationale for the secondary survey includes determining if there is more than one injury, if medical help is more than 20 minutes away and / or if you have to transport the casualty.

Once the primary survey is completed, time permitting, a secondary survey is initiated. It can be done if medical help is on the way. These steps should only be done if all life threatening conditions are taken care of, so if you are performing CPR you should not do the Secondary Survey.

**There are 3 steps to a secondary survey:**

**Step 1. History of the casualty.**

An effective acronym to determine the history of the casualty is "SAMPLE":

- **S** – Sign and Symptoms. What are the signs and symptoms? Can you tell me what's been bothering you today?
- **A** – Allergies. Do you have any allergies? Have you ever had an allergic reaction?
- **M** – Medications. Are you taking all of your medications? What medications are you currently taking? Have you stopped taking any of your medications?
- **P** – Past Medical History. Do you have any medical conditions that your doctor is concerned about? What medical problems do you have?
- **L** – Last Meal. (Last oral intake/last thing to eat or drink) When was the last time you ate? How long has it been since your last meal?
- **E** – Event Prior To. What were you doing before this happened? Has this happened before?

**Step 2. Monitor vital signs / ABC's**

Check breathing, skin color, skin temperature and lack or amount of sweat.

**Step 3. Conduct a Head-to-toe examination.**

This is a systematic (from head to toe) assessment to determine what other injuries the casualty may have that the casualty could not feel or is in too much shock to recognize.

- Check the head. Check for bumps, bleeding bruises and swelling.
- Check the eyes. Check the pupils, are they equal and responsive?
- Check the ears. Is any fluid present? Any bruising around the eyes?
- Check the mouth and nose. Any unusual odors such as alcohol? Any fluids or bleeding?
- Check the neck. Check for bruises and bumps.
- Check the shoulders and collarbone. Any bruises or bumps? Are they symmetrical?

- Check the ribs. Are they able to expand lungs? Any bruises or bumps? Are they symmetrical?
- Check the spine. (If visible) Any bruises or bumps?
- Check the pelvis. Is it stable? Is it symmetrical?
- Check the abdomen. Is the abdomen rigid? Any bruising or distension?
- Check the legs and arms. Any bruises or bumps? Is it symmetrical? Able to move?
- Check the feet and hands. Any reaction to pain? How is the strength of the feet and hands? Any bumps or bruises? Are they symmetrical?

Provide first aid for any injuries you find immediately. Taking action is the most essential principle in first aid. The extent of aid depends on the circumstances of each situation (i.e. there may not be time to splint) and priorities of giving first aid are those injuries most likely to be life threatening. First aiders should adopt a “life over limb” mentality in which priority should be given to life threatening emergencies first.

When conducting the head to toe check the first aider should be careful not to aggravate or cause further injury while conducting the assessment. Do not push on soft, swollen or bleeding parts.

If the casualty is unconscious then conduct a hands on survey (you put your hands on the casualty). If the casualty is conscious then get permission and have the casualty conduct the checks on themselves (hands off check).

If the casualty is conscious, the first aiders should take note of what the casualty is experiencing during each component of the head-to-toe check.

With a hands-on check consistently check your hands for signs of blood from the casualty.

First aiders should also be vigilant for and be aware of any medic alert bracelets.

## Ongoing Care/Continual care

Ongoing care and continual care are terms used interchangeably in this book. The final stage of ESM is providing ongoing casualty care. Once first aid for non-life threatening injuries has been provided, one of three things happens:

- For a minor illness or injury that does not require medical attention, you may hand control of the scene to the casualty, or someone else, and end your involvement in the emergency.

- You stay in control of the scene and wait for EMS to arrive.
- You stay in control of the scene and transport the casualty to medical help (do not do this for major injuries, always wait for EMS/911).

While remaining in control, you must continue to provide first aid until EMS arrive and take over. For injuries and illnesses that occur in the workplace the first aider should complete a worksite first aid record. If EMS is arriving provide a report to the EMS responders.

## **RECOVERY POSITION**

This position protects the casualty's airway while minimizing the bending and twisting of the spine which is overall a safe position for your casualty. (No damage to head/neck/spine suspected at this time) You may use this positioning when you need to leave the casualty or to protect the casualty as you wait for help to arrive. To put in this position

- put 1 arm 90 degrees in front of casualty
- bend the opposite leg at the knee
- put other arm on casualties chest
- decide if you are pulling them towards or pushing them away from you
- put your hand on shoulder and knee, pull casualty onto side
- adjust airway and check for breathing
- cover with blanket, wait for help to arrive/ go get help

## **Shock**

Shock occurs when the vital organs do not get enough oxygen-rich blood. It can be caused by many things and should never be dismissed/ ignored as it can be life threatening. Many things can cause shock, so we must always treat for it.



## Types of Shock

Shock Type	Description
Cardiogenic Shock	Shock as a result of a malfunction of the heart. For example, a heart attack, where not enough blood is moving through the circulatory system.
Hypovolemic Shock	Occurs when not enough blood is present in the circulatory system for sufficient blood flow. For example, when there is major blood loss from a cut.
Distributive Shock	Occurs when something such as an allergic reaction / infection / spinal cord injury allows leaking of fluid from or dilation of the blood vessels. This can result in pooling of blood and a drop in blood pressure.
Obstructive Shock	Occurs when something prevents forward flow of blood from the heart such as fluid around the heart, or a pneumothorax (a ruptured lung).

## Common Causes

- Blood loss.
- A weak heart from a heart attack or other heart related issues.
- Infection.
- Extensive burns.
- Fluid loss.
- Major surgery
- Crush Injuries

## What to Look for

- Anxiety.
- Fever.
- Confusion.
- Cool, clammy skin.
- Drowsiness.
- Skin that is paler than normal.

- Weakness.
- Nausea and vomiting.
- Rapid breathing.
- Excessive thirst.

## Stages of shock

Shock follows three stages

- Compensated Shock
  - Blood vessels constrict – blood moves to body core, away from extremities
  - Heart beats faster
  - Pale, Cool Clammy Skin
- Decompensated Shock
  - Lungs take in less oxygen – cells begin to be deprived of O<sub>2</sub>
  - Confusion – heart slows – breathing rapid
- End Organ Dysfunction
  - Blood vessels expand – general hypoxia – blood thickens
  - Multiple organs, including the heart and lungs begin to fail

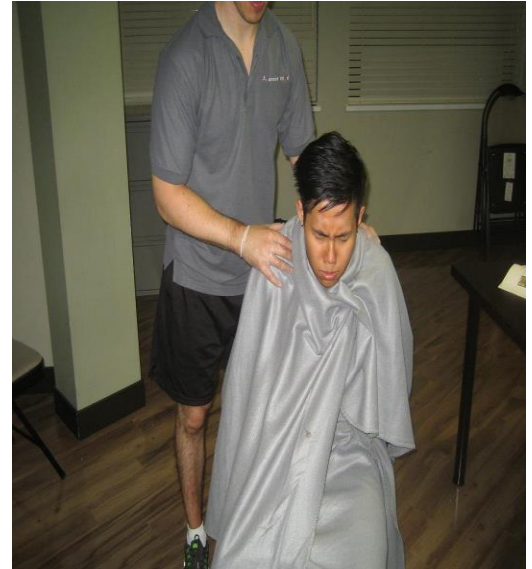


Figure 5: Rest, warmth and reassurance are effective methods of treating for shock.

Should a patient move from the second stage to third, there is a very high likelihood they will die. Patients who are in shock must receive immediate medical attention to prevent them from entering further stages of shock.

## How to Give First Aid for Shock

- Conduct a scene survey, make sure the area is safe
- Conduct a Primary Survey
- Contact EMS
- Reassure the casualty.
- Loosen tight clothing.
- Place the casualty in the most comfortable position possible.
- Cover the casualty to preserve body heat.

- Treat the cause if possible, such as controlling bleeding.
- Monitor the casualty's condition
- Monitor the ABCs often.
- Give nothing by mouth (food or water).
- Record the events of the situation.
- Report what happened to EMS when they arrive.

## Fainting

Fainting is the sudden and brief loss of consciousness as a result of decreased blood flow to the brain. Causes include circulatory problems, low blood sugar, seizures, panic, anxiety attacks or something as simple as standing up too quickly from an extended period of sitting down. Most fainting occurs for a brief amount of time.

### Common Causes

- Fear
- Emotional Trauma
- Sudden drop in blood pressure
- Dehydration
- Standing up too quickly
- Standing in one position too long
- Seizures
- Drugs / Alcohol
- Hyperventilation
- Cover the casualty to preserve body heat.

### What to Look for / Warning Signs

- Confusion.
- Blurred vision
- Feeling warm or hot.
- Weakness, dizziness and unsteadiness
- Nausea and vomiting.
- Yawning (not all cases)

- A feeling of heaviness in the legs

## First Aid for Fainting

- Conduct a scene survey; make sure the area is safe.
- Conduct a primary survey. Make sure all life threatening injuries (primary survey) are handled first and contact EMS/911 (if needed).
- If the casualty is unconscious and If injuries permit (no spinal injury), place the casualty in the lateral side-lying recovery position
- If the unresponsive casualty is not breathing or only gasping, ensure 911 has been called and if available, retrieve an AED. Start CPR
- Treat for shock – loosen tight clothing around the neck
- Give the casualty space and conduct a secondary survey.
- Monitor ABC's
- Give ongoing care until EMS arrives or fully recovered.

## When to Contact EMS for Fainting

You should contact EMS when someone has fainted and:

- Does not regain consciousness after 1 minute
- Caused severe injury from falling
- Is pregnant
- Has diabetes
- Has no history of fainting and is over the age of 50
- Is complaining about chest pain
- Is unable to move their limbs
- Remains confused and disoriented

Do NOT give an unconscious person any food or drink

## Unconsciousness

Unconsciousness is when a person suddenly becomes unable to respond to stimuli and appears to be asleep. A person may be unconscious for a few seconds (fainting) or for longer periods of time.

A casualty that becomes unconscious does not respond to loud sounds or shaking. The casualty may even stop breathing or their pulse may become faint. This calls for immediate emergency attention.

## Common Causes

Common causes of unconsciousness include:

- a car accident
- severe blood loss
- a blow to the chest or head
- a drug overdose
- alcohol poisoning

A person may become temporarily unconscious (faint) when sudden changes occur within the body.

Common causes of temporary unconsciousness include:

- low blood pressure
- syncope (loss of consciousness due to lack of blood flow to the brain)
- low blood sugar
- dehydration
- heart problems
- neurologic syncope (loss of consciousness caused by a seizure, stroke, or transient ischemic attack)
- straining
- hyperventilating

## What to Look for / Warning Signs

Symptoms that may indicate that unconsciousness is about to occur include:

- sudden inability to respond
- slurred speech
- a rapid heartbeat
- confusion
- dizziness or lightheadedness

## First Aid for Unconsciousness / Semi-Consciousness

- Conduct a scene survey; make sure the area is safe.
- If casualty is semi-conscious or unconscious and unresponsive, medical help is to be summoned.
- If injuries permit (no spinal injury), place the casualty in the lateral side-lying recovery position
- If the unresponsive casualty is not breathing or only gasping, ensure 911 has been called and if available, retrieve an AED. Start CPR
- Treat for shock – loosen tight clothing at neck, chest and waist
- Give the casualty space and conduct a secondary survey.
- Give ongoing care until EMS arrive.
- Record events
- Provide EMS with the results of the AVPU scale mentioned previously.

## Multiple Casualty Incidents (Triage)

At some emergency scenes the first aider may end up dealing with more than one casualty. When this happens it is referred to as Triage. The first aider quickly assesses each person for their injuries and decides who is most critical and needs transport first.

Casualties are categorized into 3 sections:

- **High Priority** – these people need immediate medical attention and must be transported right away. ABC's are at risk
- **Medium Priority** – these people are stable for now and can wait at least 1 hour for transport with no immediate danger to themselves. ABC's stable for now but could have lifelong disability due to fracture etc.
- **Low Priority** – these people can wait to be transported as minimal injuries and no threat to themselves or are obviously dead. ABC's are stable, minor burn/bleeding, confusion, etc.

## First aid for triage (multiple casualty incident)

- Begin ESM, determine how many people are injured
- Begin primary survey – starting inward working outwards, give aid for life-threatening injuries and move on from obviously dead
- Move to next casualty and repeat above step
- Categorize each casualty – high, medium and low priority
- Arrange transportation for casualties
- Begin secondary survey for highest priority, give aid to injuries found and then move on

- Perform ongoing care for all involved until everyone is transported. You will need to reassess as the situation progresses.

## Chapter 4

### Airway Emergencies

There are two types of choking – mild and severe. They both reflect a lack of oxygen intake due to an airway blockage, either partially or completely. The airway is the passage connecting the mouth and nose to the lungs.

#### Mild Choking

Mild choking occurs when the airway is only partially obstructed. Coughing may be a symptom of a mild airway obstruction and is a natural way of clearing the airway. When the air exchange is good, the casualty can cough and speak. When the air exchange is poor the victim has a weak and ineffective cough, breathing becomes increasingly difficult and the victim cannot speak. In either case the casualty should not be interfered with and encouraged to continue coughing. On occasion, a coughing spell may result in the object lodging further into the airway causing a complete blockage. If the casualty turns blue treat him or her as having severe choking / complete airway obstruction.

#### Severe Choking

Severe choking is defined as a complete blockage caused by a foreign object.

#### Possible Causes

- Improperly chewing food.
- Laughing or talking while eating.

Common choking objects for children

- Small objects such as toys or balloons.
- Food such as hot dogs, candies, grapes, popcorn, and nuts.

#### Prevention



Figure 6: Common symptoms of severe choking include clutching of the throat with hands, inability to speak, cough or breathe and wide eyes.



Many choking instances can be prevented with some basic steps. These include:

- Sit down while you are eating.
- Do not to talk with your mouth full.
- Ensure food is cut into small pieces that cannot block the airway.
- Always supervise children when they are eating.
- Limit or abstain from alcohol intake while eating because alcohol slows down muscles and reflexes. (Relaxes the muscles.)
- Make sure children and infants play with age appropriate toys.

## Symptoms of Severe Choking

- Look of panic (wide eyes).
- Clutching of the throat with hands.
- Inability to speak, cough, or breathe.
- Change in the colour of the face. Usually pale or blue.

## What to Do

First aid needs to be performed immediately for all emergencies where the casualty is not breathing. Without oxygen reaching the brain, irreversible brain damage starts to occur within 5 minutes.

Your decision about what to do in a choking situation will be influenced by the age of the victim and whether or not they are conscious. The following are some of the proper procedures for choking adults, children and babies.



Figure 7: Alternating between back blows and abdominal thrusts is an effective method of aiding a casualty of severe choking.

# Conscious Choking Adult

## Scene Survey

- Check the scene to ensure it is safe.
- Take charge of the situation.
- Check responsiveness by introducing yourself and obtaining consent.
- You do not need to call EMS/911 while the victim is conscious.



Figure 8: Abdominal thrusts are effective for removing severe obstructions.

## Primary Survey

- Ask the casualty "Are you choking?" If he / she can cough encourage them to keep coughing. If the casualty cannot speak or breathe, use back blows and abdominal thrusts to remove the blockage:
  - Position yourself to stand beside the adult and wrap one arm diagonally across the adult's chest.
  - Bend the adult forward at the waist until the upper airway is parallel to the ground.
  - With the heel of your other hand, deliver five firm back blows between the shoulder blades (As seen in figure 7)
  - Stand behind the casualty ready to support them if they become unconscious.
  - Make a fist with your hand and place it an inch above the belly button but below the sternum. Give 5 thrusts with the intention of object removal. Use only your fist supported by your other hand.
  - Keep alternating between 5 back blows and 5 abdominal thrusts until the object removed or the casualty becomes *unconscious*. If the airway is cleared, proceed to "Continual Care" phase. If the casualty becomes unconscious, remain calm and follow the steps for unconscious adult choking.
  - If the casualty is too large or pregnant substitute abdominal thrusts with chest compressions.

## Continual Care

Keep the patient calm and treat for shock. You may also suggest that they see a doctor as the abdominal thrusts can cause injury. A Secondary Survey should also be performed at this point.

# Conscious Choking Child

## Scene Survey

- Check the scene to ensure it is safe.
- Determine the MOI.
- Take charge of the situation.
- Check responsiveness by introducing yourself and obtaining consent.
- You do not need to call EMS/911 while they are conscious.

## Primary Survey

- Ask the victim "Are you choking?" If he / she can cough then encourage them to keep on coughing. If the casualty cannot speak or breathe, use back blows and abdominal thrusts to remove the blockage:
  - Kneel behind the child and wrap one arm diagonally across the child's chest.
  - Bend the child forward at the waist until the child's upper airway is at least parallel to the ground.
  - With the heel of your other hand, deliver five firm back blows between the shoulder blades.
  - Make a fist with your hands and place it about an inch above the belly button (as seen in figure 8). Give each thrust with the intention of object removal. Use only your fist supported by your other hand. Provide 5 thrusts.
  - Keep alternating between the back blows and abdominal thrusts until the object is removed or the casualty becomes unconscious. If the airway is cleared, proceed to "Continual Care" phase. If the child becomes unconscious, remain calm and follow the steps for unconscious choking.

## Continual Care

Keep the patient calm and treat for shock. You may also suggest that they see a doctor as the abdominal thrusts can cause damage. A Secondary Survey should also be performed if no life threatening conditions are present. Always retrieve the blocked item and place it in a zip lock bag (if available). If the item that is dislodged has blood or tissue on it then assist or advise the casualty to go to the hospital. If blood and tissue is not present then advise the casualty to seek medical attention.

# Conscious Choking Infant

## Scene Survey

- Check the scene to ensure it is safe.
- Determine the MOI.
- Take charge of the situation.
- Check responsiveness by introducing yourself and obtaining consent.
- Ask a bystander to call EMS/911 and get an AED, if available.

## Primary Survey

- If the baby is coughing or gagging, the choking is mild. Pretend to cough as well so that the baby mimics you. Do not interfere. If the baby is making high-pitched noises, wheezing, can no longer make a noise, or becomes too weak to cough, have someone call EMS/911 and get an AED, then care for the baby:
  - Look in the baby's mouth for any foreign objects. If you see a foreign object that you can remove scoop it away from the mouth using your pinky finger. Always check the mouth for foreign objects in between back blows and chest compressions.
  - In a kneeling position, hold the baby between your forearms, supporting the head and neck.
  - Turn the face of the baby down with the head lower than the body.
  - Lower your forearm onto your thigh. With the heel of your hand, deliver five firm back blows between the shoulder blades.
  - If the object has not been dislodged, while still supporting the head and with the head lower than the body, turn the baby face up. Then put the infant on your opposite thigh. Next, place two fingers on the middle of the chest just below the nipple line and “push hard, push fast” at least 4 cm (or 1.5 in.) or 1/3 to 1/2 the depth of the chest five times. Repeat the five back blows and chest thrusts until the object is dislodged; the baby starts to cry, breathe, or cough; or the baby becomes unconscious. If the airway is cleared, proceed to “Continual Care” phase. If the baby becomes unconscious, remain calm and follow the steps for unconscious choking infant.



Figure 9: Participants in CPR courses will practice back blows using infant mannequins.

## Continual Care

Wait for EMS/911 to arrive. Keep the baby as calm as possible and treat for shock. A Secondary Survey should also be performed at this point.

## Unconscious Choking Adult

### Scene Survey

- Check the scene to ensure it is safe.
- Determine the MOI.
- Wear appropriate personal protective equipment.
- Take charge of the situation.
- Check responsiveness by introducing yourself and obtaining consent. Tap the person's shoulders if they do not respond.
- Ask a bystander to call EMS/911 and get an AED, if available.

### Primary Survey

- If necessary, turn the casualty face up. Open the airway using the head-tilt chin-lift.
- Check for normal breathing for no more than 10 seconds (i.e., with head-tilt chin-lift, *look, listen, and feel*).
- Start CPR commencing with 30 compressions. Compress over the lower half of the sternum at the nipple line, at a depth of at least 2 inches (5 cm), pushing hard and fast and at a compression rate of 100 to 120 / minute. Allow full chest wall recoil, after each compression, rescuers must avoid leaning onto the chest wall between compression.
- Open the mouth using the head-tilt chin-lift and look for a foreign object. Use your thumb to press on the tongue to help view the obstruction. Remove the obstruction using a hooking motion with your finger with the tongue depressed if you see it and are confident it can be removed. After removing or attempting removal of the obstruction, give 2 breaths using personal protective equipment (i.e. pocket mask with one way valve), each breath delivered over one second, each causing the chest to rise. If rescue breaths are not possible, do chest compressions only. If the first breath does not make the chest rise, readjust and attempt the

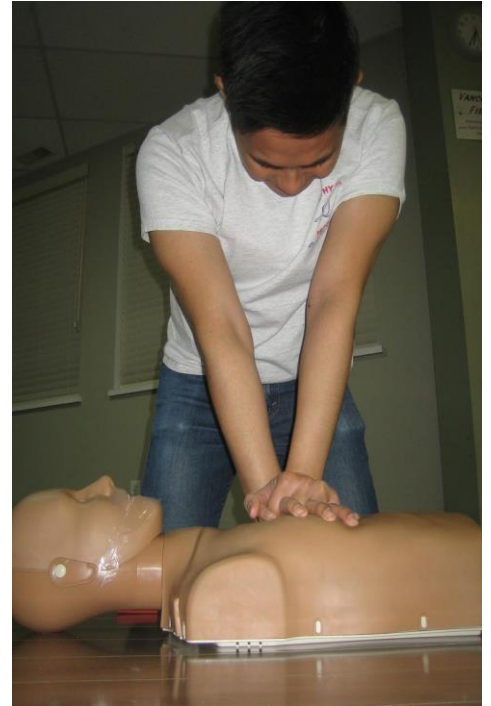


Figure 10: Chest compressions should be provided in the center of the upper chest in a hand-over-hand position.

second breath. Only ever attempt two breaths then continue compressions. Let the casualty's chest deflate between each ventilation.

- If the obstruction is removed and ventilations are successful, continue CPR with cycles of 30 compressions and 2 breaths until an AED becomes available and is connected for use. Follow the AED prompts or until EMS takes over. When 2 or more rescuers are present, one rescuer should begin the steps of CPR if the casualty is unresponsive while a second rescuer activates the EMS system and gets the AED if available. If the person starts to breathe, move to Continual Care.
- If the ventilations are unsuccessful (the chest does not rise even after readjusting) continue with 30 chest compressions, checking the airway and attempting ventilations until the object is dislodged or ventilations are successful.

### **Continual Care**

Keep the patient calm and treat for shock while waiting for EMS/911 to arrive. A Secondary Survey should also be performed at this point.

## **Unconscious Choking Child**

### **Scene Survey**

- Check the scene to ensure it is safe.
- Wear appropriate personal protective equipment
- Take charge of the situation.
- Check responsiveness by introducing yourself and obtaining consent. Tap the child's shoulders if they do not respond.
- Ask a bystander to call EMS/911 and get an AED, if available.

### **Primary Survey**

- If necessary, turn the child face up. Open the airway using the head-tilt chin-lift.
- Check for normal breathing for 10 seconds (i.e., with head-tilt chin-lift, *look, listen, and feel*).
- Start CPR commencing with 30 compressions. Compress over the lower half of the sternum at the nipple line, at a depth of at least 2 inches (5 cm), pushing hard and fast and at a compression rate of 100 to 120 / minute. Allow full chest wall recoil, after each compression, rescuers must avoid leaning onto the chest wall between compression.

- Open the mouth using the head-tilt chin-lift and look for a foreign object. Use your thumb to press on the tongue to help view the obstruction. Remove the obstruction using a hooking motion with your finger with the tongue depressed if you see it and are confident it can be removed. After removing or attempting removal of the obstruction, give 2 breaths using personal protective equipment (i.e. pocket mask with one way valve), each breath delivered over one second, each causing the chest to rise. If rescue breaths are not possible, do chest compressions only. If the first breath does not make the chest rise, readjust and attempt the second breath. Only ever attempt two breaths then continue compressions. Let the casualty's chest deflate between each ventilation.
- If the obstruction is removed and ventilations are successful, continue CPR with cycles of 30 compressions and 2 breaths until an AED becomes available and is connected for use. Follow the AED prompts or until EMS takes over. When 2 or more rescuers are present, one rescuer should begin the steps of CPR if the casualty is unresponsive while a second rescuer activates the EMS system and gets the AED if available. If the child starts to breathe, move to Continual Care.
- If the ventilations are unsuccessful (the chest does not rise even after readjusting) continue with 30 chest compressions, checking the airway and attempting ventilations until the object is dislodged or ventilations are successful.

### **Continual Care**

Keep the child calm and treat for shock while waiting for EMS/911 to arrive. A Secondary Survey should also be performed at this point.

## **Unconscious Choking Infant**

### **Scene Survey**

- Check the scene to ensure it is safe.
- Wear appropriate personal protective equipment.
- Take charge of the situation.
- Check responsiveness. Tap the babies feet if they do not respond.
- Ask a bystander to call EMS/911 and get an AED, if available. If you are alone, follow the Primary Survey steps 5 times, or two minutes, then take the baby with you to call EMS/911.

### **Primary Survey**



- If necessary, turn the baby face up. Open the airway using the head-tilt chin-lift.
- Check for normal breathing for no more than 10 seconds (i.e., with head-tilt chin-lift, *look, listen, and feel*).
- Start CPR commencing with 30 compressions. Compress using two fingers just below the nipple line at a depth of at least 4 cm (or 1.5 inches), pushing fast at a rate of 100 to 120/minute. Allow full chest wall recoil, after each compression, rescuers must avoid pushing on the chest wall between compressions. Minimize pauses in compressions (do not interrupt compressions for greater than 10 seconds).
- Open the mouth using the head-tilt chin-lift and look for a foreign object. Use your thumb to press on the tongue to help view the obstruction. Remove the obstruction using a hooking motion with your pinky finger with the tongue depressed if you see it and are confident it can be removed. Attempt 2 ventilations using personal protective equipment if available. To provide effective ventilations use your mouth to cover the baby's mouth and nose and giving no more than a cheek puff. If the first breath does not make the chest rise, readjust and attempt the second breath. Only ever attempt two breaths.
- If the obstruction is removed and ventilations are successful, continue CPR with cycles of 30 compressions and 2 breaths until an AED becomes available and is connected for use. Follow the AED prompts or until EMS takes over. When 2 or more rescuers are present, one rescuer should begin the steps of CPR if the infant casualty is unresponsive while a second rescuer activates the EMS system and gets the AED if available. If the infant starts to breathe, move to Continual Care.
- If the ventilations are unsuccessful (the chest does not rise even after readjusting) continue with 30 chest compressions, checking the airway and attempting ventilations until the object is dislodged or ventilations are successful.

## **Continual Care**

Keep the infant as calm as possible and treat for shock while waiting for EMS/911 to arrive. A Secondary Survey should also be performed at this point.



## Breathing Emergencies

Either injury or illness can impact a person's capacity to breathe. This impact poses an immediate threat and can put a person's life in danger. Recognizing a breathing emergency is a vital skill for first aiders.

### Hypoxia

Hypoxia is a result of a lack of oxygen in the blood. Poor blood oxygen levels can damage tissues and lead to death if not addressed. There are several underlying reasons for hypoxia:

#### *Lack of oxygen*

- The oxygen is displaced by other gases
- An environment can have oxygen levels that are low (e.g., high altitude)
- The oxygen in a small space is consumed

#### *Blocked airway*

- The casualty's airway is swollen (e.g., infection or allergic reaction)
- The casualty chokes on a foreign object
- The casualty is face up while unconscious and the tongue blocks the airway

#### *Ineffective breathing*

- Inhalation injury (e.g., due to smoke)
- Drug overdose
- Spinal cord injury
- Severe chest injury

#### *Abnormal heart function*

- An injury to the head, spine, chest or other area
- A drug overdose
- Poisoning
- An illness

## Signs of Normal Breathing

Breathing rate, rhythm, and depth are the indicators for normal breathing. *Breathing rate* is the number of breaths per minute. *Breathing rhythm* is the interval between breaths. *Breathing depth* is the amount of air moved in and out of the lungs during each breath.

Normal breathing can also be represented by:

- Quiet and effortless breathing
- Normal skin colour
- Chest movement is equal on both sides
- Person is alert
- Person is able to speak freely without taking too many breaths

Breathing Rates (Breath per Minute)			
	Normal range	Slow	Fast
Adult	12-20	Under 10	Over 30
Child	20-30	Under 15	Over 40
Infant	30-50	Under 25	Over 60

## Indicators of Ineffective Breathing

Breathing is considered effective when breathing is normal. When a person's body becomes impaired, breathing is classified as ineffective. Ineffective breathing can take a variety of forms and be caused by a variety of factors. When breathing is severely affected, the casualty is determined to have severe *breathing difficulties*.

### Signs and symptoms of severe breathing difficulties

- Casualty struggles (gasps) for air
- Casualty may be sweaty
- Person is anxious, even terrified

- Decreased level of consciousness
- Person indicates they are “getting tired”
- Unable to feel air moving in and out of nose
- Breathing rhythm is irregular
- Little to no chest movement
- Breathing rate is too slow or too fast
- Chest movement is abnormal
- Breathing depth is too shallow or too deep
- Lips, ears, fingernail beds appear bluish

## First Aid for Breathing Emergencies

- Begin ESM by ensuring the scene is safe.
- Complete the primary survey. If necessary, begin CPR
- Wear appropriate personal protective equipment
- Call for medical help.
- Place the casualty in a semi-sitting position
- If there are open wounds in the chest leave them open
- Support broken ribs
- Loosen tight clothing.
- Reassure the casualty to keep them calm. Monitor his or her breathing.
- Treat the casualty for shock.



Figure 11: Rescuers should use personal protective equipment, such as pocket masks, if they are available.

## Effective Ventilations / Artificial Respiration

Artificial respiration (AR) is a method for supplying air to the lungs when a casualty is not breathing or has breathing difficulties. It is a way to ensure oxygen continues to supply the brain, heart, and other organs. During a primary survey, you check the casualty for their breathing. It is at this point where artificial respiration is applied.

## Techniques for Artificial Respiration (Rescue Breathing)

- **Mouth-to-Mouth AR** – the most common technique. This entails pinching the nose closed and blowing into the casualty's mouth.
- **Mouth-to-Nose AR** – When mouth-to-mouth is not available or inappropriate you can hold the casualty's mouth closed and breathe through their nose.
- **Mouth-to-mouth-and-nose AR** – used for infants and small children where your mouth is able to fit over both the mouth and nose
- **Mouth-to-stoma AR** – for casualties who have had a tracheostomy, the AR is delivered through a hole in their neck (the stoma)

## Chapter 5

### Cardiovascular Emergencies

More Canadians die of cardiovascular disease than any other cause. With the appropriate first aid training, many of these deaths can be prevented. This chapter outlines the appropriate responses for a variety of cardiovascular emergencies.

#### Anatomy and Physiology

The heart is a 4 chambered muscular organ located in the chest, midline, and slightly to the left. This organ brings de-oxygenated blood, from the veins, and brings it into the right chambers of the heart. It then pumps this blood into the lungs where oxygen and carbon dioxide is exchanged. This oxygenated blood gets forced into the left side of the heart and is then pumped into the arteries where it circulates throughout the body. On average, the heart pumps approximately 60-80 times per minute when an average adult is at rest (higher for children and infants).

The heart is controlled by the brain and spinal cord; and receives a signal to pump via the sinoatrial node (a nerve bundle) located near the top right side of the heart. This node instructs the muscle tissue to contract, which creates the pumping action of the heart.

#### Modifiable Prevention for cardiovascular disease:

- Live a healthy lifestyle. Eat healthy foods. Avoid fatty deep fried foods and heavily processed foods. Try to have a good amount of vegetables and fruits in addition to healthy proteins and carbohydrates. Avoid having high LDL, or “bad” cholesterol, and low HDL, or “good” cholesterol.
- Get plenty of exercise. A recommended minimum amount of 30 minutes of low impact exercise per day is ideal. Do not overexert yourself. Always talk to your doctor before starting a new sport or exercise regimen.
- Lower your stress. Know what your triggers are and make a plan. Have rewarding hobbies and set attainable goals (far-fetched goals will make you depressed if you do not meet them).
- Monitor your health. Take annual check-ups and make sure blood pressure, cholesterol and sugar levels are all healthy.
- Try to reduce alcohol, drug and tobacco intake.

## Non Modifiable:

- Age (those older are more at risk but cardiovascular disease starts as young as teens)
- Hereditary - those with a family history of cardiovascular disease should monitor their health and diet even more closely.

## Cardiovascular Disease

Cardiovascular diseases are disorders of the blood vessels or the heart. High blood pressure and plaque build-up on the artery walls, called atherosclerosis, are some of the common causes of cardiovascular diseases. Several emergencies can result from these two disorders including heart attack, angina, congestive heart failure (CHF), stroke, transient ischemic attack (TIA), and cardiac arrest.

## High Blood Pressure

Blood pressure is the pressure of blood against the inside walls of the blood vessels. Blood pressure goes up and down naturally. When a person is excited or emotionally stressed, blood pressure goes up, but typically comes down after any excitement passes.

When blood pressure is high all the time, the condition is called *hypertension*. Hypertension damages the tissues of the cardiovascular system over time. The walls of the blood vessels become thick and lose their elasticity. The heart may become enlarged due to being over worked.

Elevated blood pressure like this increases the risk of heart attack, stroke, eye and kidney problems. Hypertension is known as the *silent killer* because it may not give warning signs and the person may feel normal.

## Narrowing of the arteries

Arteries are the blood vessels that carry blood away from the heart. They become diseased when plaque builds up along the walls. This process is called *atherosclerosis*. When this occurs in the coronary arteries of the heart, it is called *coronary artery disease*.

When an artery gets narrowed, less blood can travel through. As a result, the tissue on the other side of the narrowing doesn't get enough oxygenated blood to function normally. Although signs and

symptoms of hardening of the arteries usually don't appear until middle age or later, atherosclerosis often begins in childhood.

## Angina

If one of the coronary arteries becomes narrowed, the blood supply feeding that part of the heart muscle is constrained. When the heart works harder, it can't get the oxygenated blood it needs through the narrowed coronary artery. This causes pain or discomfort in the chest which may spread to the neck, jaw, shoulders and arms. Other signs and symptoms include fear, pallor, shortness of breath, fatigue, and lightheadedness. This is called *angina pectoris*. It usually will not last long and goes away if the person rests or takes the appropriate medication.

## Heart Attack/Myocardial Infarction (MI)

A heart attack (MI) happens when heart muscle tissue dies because its supply of oxygenated blood has been cut off. Usually, a blood clot gets stuck in a coronary artery that has been narrowed through atherosclerosis. The supply of blood is cut off and the heart tissue beyond the clot is starved of oxygen. A heart attack can feel just like angina, except that the pain doesn't go away with rest and medication. If the heart attack damages the heart's electrical system, or if a lot of the heart muscle is affected, the heart may stop beating. This is known as cardiac arrest.

### Signs and Symptoms:

- Chest pain
- Sweating
- Shortness of breath
- Cool, moist and pale skin
- Vomiting
- Denial
- Men & Women present differently from heartburn to pulled muscles
- Any of the signs and symptoms for Angina

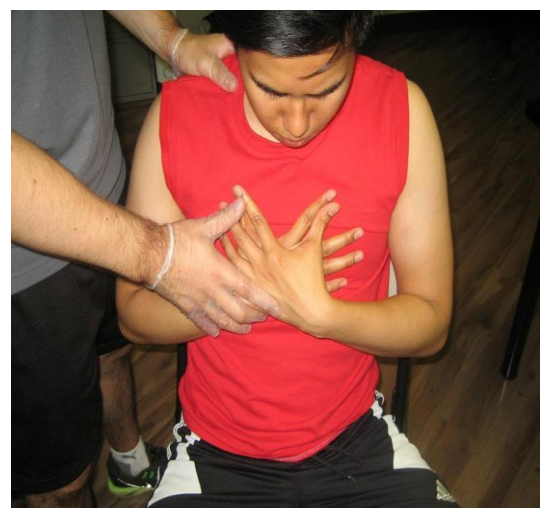


Figure 12: Chest pain is a common symptom of Angina and Heart Attacks.

## First Aid for Angina and Heart Attack

Remember, a first aider cannot decide or diagnose a casualty for whether they are experiencing either a heart attack or angina. As a result, first aid for both is the same:

- Begin Emergency Scene Assessment (ESM) by ensuring the scene is safe
- Complete the primary survey

Ask questions:

- *Can you show me where it hurts?*
- *What are your symptoms?*
- *Have you had this pain before?*
- *Do you have medication for this pain?*
- Upon recognizing the symptoms as suspicious for heart attack or angina, call someone to get medical help. If you have to leave to call, be sure to place the casualty at rest before leaving.
- Wear appropriate personal protective equipment
- Place the casualty at rest to decrease stress on the heart. As a rule, the most comfortable position is the best position. Let the casualty attempt what has worked for them before.
- Make the casualty comfortable by loosening tight clothing. Reassure them to not worry (remember that panic is contagious).
- Assist with medications as required. For casualty experiencing chest pain, if available and the casualty does not have an allergy to ASA and / or history of recent gastro-intestinal bleed and provides consent, assist with administering two 81 mg of chewable ASA (baby aspirin) or one regular adult strength (not enteric coated) 325 mg ASA tablet to chew. Information on medication in first aid kits is available in Chapter 8.
- If the casualty loses consciousness and stops breathing, commence with CPR.
- Treat the casualty for shock
- Monitor the casualties vital signs



## Five Rights of Medication

When assisting in the administration of medication for an injured or ill person, First Aiders must follow a set of guidelines known as the 5 Rights of Medication. They include:

- **Right Person** – Ensure the person getting the medication is the one whose name is on the container or label.
- **Right medication** – Read the label when you are getting the right medication.
- **Right amount** – Use an accurate measuring device or container.
- **Right time** – Give medication at the appropriate point in time.
- **Right method** – Read the directions carefully.

## Stroke

A stroke is the sudden interruption of blood supply to the brain. A person could have sudden impairments or loss of consciousness, or loss of sensation.

A severe stroke causes brain damage and may result in death. In both a heart attack and stroke, hardening of the arteries is the main cause. Over time, the arteries become narrowed which can lead to a clot blocking a narrowed artery. A stroke can also be caused by a ruptured artery. Other causes for a stroke include an artery in the brain that has ruptured, or a tumor putting pressure on an artery.

A condition related to a stroke is called a *transient ischemic attack* (TIA) also known as mini stroke. A TIA is caused by a lack of oxygen to part of the brain. It has the same signs and symptoms as a stroke. A TIA lasts from a few minutes to 24 hours and leaves no permanent brain damage. Although a TIA is not life threatening, those that have them are at an increased risk of having a stroke. Anyone who has a TIA should get medical help.

### Signs of Stroke or TIA

Signs and symptoms of a stroke may include:

- Paralysis of facial muscles
- Difficulty speaking or understanding
- Dizziness

- Loss of balance or coordination
- Numbness or weakness on one side
- Decreased consciousness
- Sudden double vision or loss of vision
- Sudden confusion
- Sudden severe headache with no known cause

## **Remember FAST**

The use of a stroke assessment system such as Face, Arm, Speech, and Time (FAST) can assist first aiders with identifying the signs and symptoms of a stroke. It includes:

**Face** drooping – ask the person to smile. Is the person's smile uneven?

**Arm** weakness – ask the person to hold out their arms. Does one arm drift downward?

**Speech** – ask the person to speak. Is the speech slurred?

**Time** – call 911 if the person shows any of these symptoms. First aiders should note the time of the signs and symptoms onset.

## **First Aid for Stroke/TIA**

- Begin ESM by doing a survey of the scene for safety
- Complete the primary survey
- Call for medical help
- Wear appropriate personal protective equipment
- Place the casualty at rest
- Give nothing by mouth. If the casualty is thirsty, wet the lips with a wet cloth.
- Do not give any medications.
- Protect the casualty from injury when they are lifted or moved.
- Reassure the casualty. Keep them warm.
- Treat for shock.
- If the casualty becomes unconscious, place them in the recovery position.
- If the casualty becomes unresponsive and breathing stops, commence with CPR.

## Cardiac Arrest

When the heart has stopped beating effectively, it is classified as being in *cardiac arrest*. A cardiac arrest can happen suddenly or may follow a period of stopped or ineffective breathing, when the oxygen in the body is no longer sufficient for cardiac function. A heart attack may cause cardiac arrest when too much of the heart tissue is damaged. Other causes of cardiac arrest include injuries, electrical shock, drugs, trauma to the chest, drowning, suffocation and stroke. The first aid for cardiac arrest is CPR and immediate medical attention.

## The Chain of Survival

As a first aider you become a part of the Chain of Survival. First aiders play a crucial role in the chain of survival. A strong chain of survival significantly improves the survival and recovery of a casualty of cardiac arrest, heart attack and other emergencies. Time is critical in the chain of survival. The following is the 5 links to the chain of survival:

- 1) Recognition of cardiac arrest and activation of the emergency response system
- 2) Early CPR with a strong emphasis on chest compressions
- 3) Rapid defibrillation (use of AED)
- 4) Basic and advanced EMS
- 5) Advanced life support and post-cardiac arrest care

## Chapter 6

### Wounds and Bleeding

A wound is any break in the soft tissues of the body. Bleeding is the escape of blood from the blood vessels into surrounding tissues, body cavities or out of the body.

There are two types of wounds

1. **Open wound** – when there is a break in the outer layer of the skin resulting in bleeding. This may permit germs to enter the body which creates a risk of infection.
2. **Closed wound** – there is no break in the outer layer of the skin and, therefore, no external bleeding. In this case the victim has internal bleeding which can be serious. The risk of infection is low except with internal abdominal injuries where the risk is high.

The aim in caring for wounds is to stop the bleeding and prevent infection. Excessive blood loss through bleeding must be stopped to minimize the risk of shock.

### Bleeding/Hemorrhage

Bleeding/hemorrhage is the escape of blood from blood vessels. There are two types of bleeding:

**External bleeding** – when blood escapes through a surface wound (visible blood).

**Internal bleeding** – when blood escapes tissues inside the body (cannot be seen).

In addition, bleeding can be *arterial* or *venous*. Arterial bleeding comes from arteries and venous from veins.

### Signs and Symptoms of Bleeding/Hemorrhage

Obviously, the main sign of bleeding is the presence of blood. However, you will not always see blood with internal bleeding. Depending on the amount of blood lost, symptoms will vary:

- Pale, cool, clammy skin
- Faintness, dizziness, thirst and nausea
- Shallow breathing, yawning, sighing

- Rapid pulse, becoming weaker

## Dressings and Bandages

### Dressings

A dressing is a protective covering put on a wound to help control bleeding, absorb blood, and prevent contamination. A dressing needs to be:

- Sterile
- Large enough to cover the wound
- Non-stick and lint-free (e.g., gauze)
- Compressible, thick and soft

#### Common dressings

- Adhesive dressings –sterile gauze dressings with adhesive strips that are sealed in plastic. They come in various shapes and sizes and used for minor wounds with little bleeding.
- Gauze dressings – folded and packaged in a variety of sizes.
- Pressure dressings – sterile dressings of absorbent material used to apply pressure to a wound with severe bleeding.
- Improvised dressings – lint-free or clean material. Includes materials such as a towel, a sheet, a pillow slip or other absorbent material. Plastic wrap can also be used as an airtight dressing for penetrating wounds of the chest.



Figure 13: Gauze dressing, pictured above, is commonly found in first aid kits and comes in a variety of sizes.

### Bandages

A bandage is any material that is used to hold a dressing in place, maintain pressure over a wound, support a limb or joint, immobilize parts of the body or secure a splint. Bandages may be commercially prepared or improvised.

Tips for bandaging:

- Apply them firmly
- Check circulation in areas around the bandaged to ensure the bandage is not too tight

- Use bandages only as bandages when other materials are available

## Tourniquet

When a bleed on a limb is severe enough, or a first aid attendant cannot control a major bleed with dressings and bandages alone, a tourniquet may be applied to control the deadly bleeding. There are many makes and models of tourniquet on the market but the process and end result is the same; a complete loss of blood flow to the affected limb. Tourniquets can cause harm and possible amputation if incorrectly applied and should only be used in situations where the blood loss may cause death. Once applied, tourniquets are not to be removed by the first aid attendant without advanced training.

### To Apply a Tourniquet

- Apply tourniquet only when the bleed is clearly life threatening and standard bleeding control measures are not effective.
- Place band about 1 hand length (2-3 inches) above the wound site and secure band or strap
  - Never place a tourniquet on or near a joint, it should be 2-3' above or below any joint
- Release the key/pen and twist until bleeding has stopped (or distal pulse is absent if trained)
- Lock the key/pen into the tightened position and secure the lock
- Mark the patient to indicate that a tourniquet has been applied and the time it was applied

## First Aid for Severe External Bleeding

- As always begin ESM by evaluating the scene for safety
- Assess the mechanism of injury and contact EMS/911.
- Wear appropriate personal protective equipment.
- To control severe bleeding, apply direct pressure to the wound as quickly as possible.
- Support the neck or head in case of a suspected head or neck injury.
- Place the casualty at rest.
- Do a primary survey of the casualty and give first aid to the most threatening injuries if there are several.
- Continue direct pressure over the dressings.
- Complete your survey, looking for other life-threatening injuries.
- Check circulation around the wound before bandaging.

- Bandage the dressing in place.
- Apply ice to the wound
- Check circulation to see if your bandage requires adjustment.
- Elevate affected limb to reduce blood loss, if it does not increase pain or bleeding
- Treat for shock
- Give ongoing care until EMS are available.
- Do not remove dressings but place additional dressings on top of current dressings

## **Minor Cuts, Lacerations, Scrapes and Abrasions**

Minor cuts, scrapes and abrasions usually do not require EMS.

### **First Aid for Minor Cuts Scrapes, Lacerations and Abrasions**

- As always begin ESM by evaluating the scene for safety
- Complete the primary survey.
- Minor cuts and scrapes usually stop bleeding on their own. If not, apply some gentle pressure with a sterile bandage.
- Use clear water to clean the wound and the area surrounding the wound.
- Apply a bandage to the wound

## **Bruises/Contusions**

A bruise/contusion is formed when a blow causes blood vessels to break near your skin surface. This blow allows for a small amount of blood to leak into the tissue under the skin and that trapped blue causes the change in color to the skin.

### **First Aid for a Bruise/Contusion**

- As always begin ESM by evaluating the scene for safety
- Complete the primary survey.
- If the skin isn't broken you do not need a bandage
- Elevate the injured area
- Rest the bruised area
- Apply cold / ice to the area

## Tooth Loss

### Prevention:

- Be aware of your surroundings to avoid injury.
- Wear proper gear (masks, helmets, mouth guards).
- Know the rules of the sport, activity and work place. Most importantly follow them.

### First Aid for Tooth Loss

- Begin ESM by ensuring the scene is safe. Assess the mechanism of injury. Complete the primary survey and contact EMS if necessary.
- Wear appropriate personal protective equipment.
- Pick up the tooth from the crown -the part you hold when you wiggle (not the root)
- Put the tooth in milk or a container with the person's own saliva to help it stay clean.
- Get the person to a dentist immediately. The likelihood a tooth will survive decreases within minutes of being out of its socket.
- Treat for shock.

## Impaled Objects

### Signs and Symptoms:

- An object sticking out of the casualty

### First Aid for Impaled Objects

- Evaluate the scene for safety, contact EMS and assess the mechanism of injury.
- Wear appropriate personal protective equipment.
- Conduct a primary survey.
- Perform secondary survey and treat the most serious injuries first. Do not remove the impaled object. Expose the area and then support the impaled object so that it does not move and further injury the casualty. The best materials to use are non-stick bulky gauze.
- Treat for shock and provide ongoing care until EMS arrives.



## Amputations

An amputation is when a part of the body like a toe, foot, or leg has been partly or fully cut off. Controlling the bleeding is the top priority and then obtaining medical help.

- Start ESM by ensuring the scene is safe.
- Assess the mechanism of injury.
- Complete the primary survey.
- Contact EMS.
- Wear appropriate personal protective equipment.
- Control the bleeding by applying direct pressure to the wound
- Care for the amputated tissue. Try to keep the amputated part preserved, regardless of its condition and taken to medical help with the casualty. It may be possible to reattach. To care for an amputated part:
  - Keep the part in a shaded, cool place. Get the part to medical help as soon as possible.
  - Wrap the part in a clean, moist dressing (dry, if this is not possible)
  - Put the part in a clean, watertight bag and seal it
  - Put this bag in a container filled with crushed ice
  - Attach a record of the name, appendage, date and time to the package
- Treat for shock.
- Provide ongoing care until EMS arrives.

## Recognizing Internal Bleeding

Internal bleeding is challenging to recognize. Suspect internal bleeding if:

- The casualty received a severe blow or a penetrating injury to the chest, neck, abdomen, or groin
- There are major limb fractures such as a fractured upper leg or pelvis

### Signs of internal bleeding

You may recognize internal bleeding by one or more of the following characteristics. Blood is:

- Coming from the inner ear canal or the nose
- Coughed up
- Seen in vomit (may be coloured red or brown or black like coffee grounds)
- Seen in stool (may look blackish, red or maroon in colour)
- Seen in urine as orange/red or brownish colour.

Pain, rigidity, and bruising may also rapidly present. Especially in the core of the body (e.g abdomen). Signs of shock could have a rapid onset depending on the degree of internal damage.

## **First Aid for Internal Bleeding**

- Start ESM by ensuring the scene is safe.
- Wear appropriate personal protective equipment.
- Do a primary survey and give first aid for life threatening injuries. Internal bleeding can be viewed as a life threatening injury.
  - If conscious, place the casualty at rest.
  - If unconscious and breathing, place the casualty in the recovery position.
  - If not breathing start CPR
- Provide ongoing care. Make the casualty comfortable and keep them protected from extreme temperatures.
- Do not give anything by mouth
- Monitor casualty often
- Keep the casualty warm / treat for shock.

## Chapter 7

### CPR & Automated External Defibrillation

Cardiopulmonary resuscitation (CPR) is a sequence of ventilations and chest compressions designed to maintain a casualty's circulation.

Broadly speaking, a lay-rescuer should start CPR when a patient is found to be unresponsive and there are no signs of breathing (or agonal breathing is present). If trained to take a carotid pulse, CPR should be initiated when a patient is found to be unresponsive, not breathing (or only agonal breathing), and carotid pulse is absent during a brief (<10 second) pulse check.

- ▶ For an adult, CPR intervention may begin as soon as 911 has been called for an unresponsive, non-breathing casualty
- ▶ Children/Infants should receive 2 min of CPR before leaving to call 911

#### How to Perform CPR

- Wear / use appropriate personal protective equipment
- If necessary, turn the casualty face up. Open the airway using the head-tilt chin-lift maneuver (Figure 14).
- Check for normal breathing for 5-10 seconds (i.e., with head-tilt chin-lift, *look, listen, and feel*). You must be able to see their chest rising and falling or hear them breathe or feel a breath against your cheek. Seeing their mouth move is an ineffective method of checking for breathing as any movement may be just spasms which may occur minutes or even hours when the victim has stopped breathing.

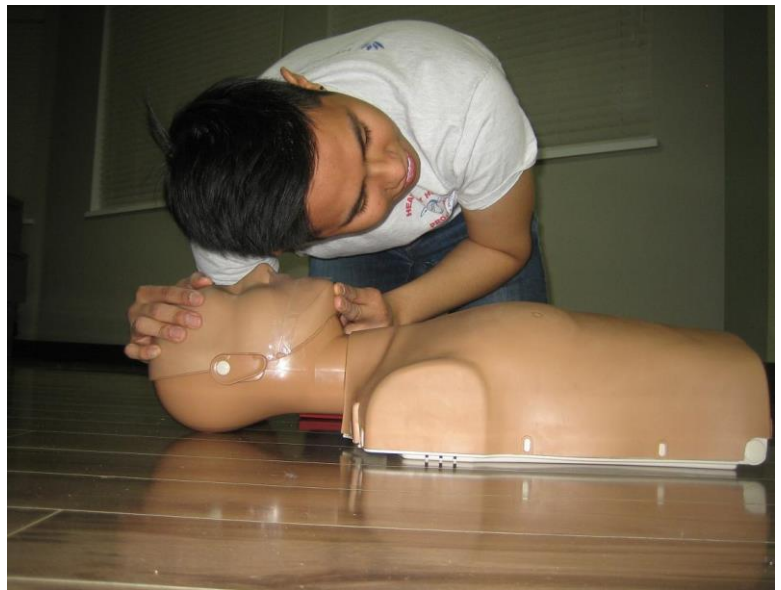


Figure 14: When checking for breathing rescuers should open the airway using the head-tilt chin-lift maneuver pictured above.

- If the victim is not breathing then designate a bystander to call EMS/911. If no one is present and you are by yourself then use your cell phone. A sim card is not required to make an EMS/911 call. If you have no reception, battery or a cellphone and the victim is an adult then leave the adult, call for help and then return to give aid. If the casualty is a child or infant and you do not have a bystander or a cellphone then give 2 minutes (5 sets of compressions and ventilations) of CPR, call EMS/911, bring the casualty with you if possible and then continue giving CPR.
- After EMS/911 has been called and emergency crews are on their way start CPR commencing with 30 compressions. Compress over the lower half of the sternum at the armpit line (mostly above nipple line,) at a depth of at least 2 inches (5 cm), pushing hard and fast and at a compression rate of 100 to 120/ minute. Allow full chest wall recoil, after each compression, rescuers must avoid leaning onto the chest wall between compression. Minimize pauses in compression (do not interrupt compressions for greater than 10 seconds).
- After the completion of 30 compressions give 2 breathes, each breath delivered over one second, each causing the chest to rise. If rescue breaths are not possible, do chest compressions only. Continue CPR with cycles of 30 compressions and 2 breaths until AED becomes available and is connected for use.
- Follow the AED prompts or until EMS takes over. When 2 or more rescuers are present, one rescuer should begin the steps of CPR if the casualty is unresponsive while a second rescuer activates the EMS system and gets the AED if available. This applies for all levels of CPR, adult, child and infant.

### **Effective Ventilations**

- Only give enough breath to see the chest rise. Children will be less air then adult due to lung size. Do not give too much air otherwise it will enter the stomach and then the casualty may regurgitate. If the casualty vomits or regurgitates then tilt them to the side, scoop out the substance and then continue CPR. Do not assume regurgitation means they're breathing. Escaping air can occur even after death.
- Use a pocket mask and gloves if available and ensure you provide an effective seal over the victim's mouth and nose.
- If the victim is an infant ventilations should be a provided as a "puff".

### **Reasons to stop CPR**

- Casualty starts breathing on their own
- Equal or higher level training comes to assist
- Exhausted (not tired). Exhausted means you will pass out if you do any more.
- Danger to yourself or the casualty (the scene is no longer safe and you and the victim need to move).

Please note average response time within a city is 8 minutes. You may need to perform CPR for 8 minutes straight if there are no bystanders to help.

## Compression Only CPR

Compression only CPR can be substituted for the above mentioned CPR when the rescuer does not have a barrier devices (e.g., a pocket mask) and is not comfortable doing mouth-to-mouth ventilations. It can also be used for when a bystander is unable or unsure of how to do full CPR. It is important to note that rescuers should not do compression only CPR on child or infant casualties, for respiratory emergencies that have caused cardiac arrest or for water related emergencies.

## AEDs

Automated external defibrillation (AED) is the application of electrical shock to a person's heart in order to make it beat normally again, especially after a heart attack. Recent technology has led to devices which are portable and both safe and easy to use. Because of AEDs, survival of cardiac arrest has been increasing.

## About AEDs

AEDs are computerized devices that drastically improve survival rates for victims of cardiac arrest. They are programmed to shock two types of heart rhythms, ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT). An AED device will advise a shock, sometimes by a voice prompt, when it recognizes either of these rhythms.

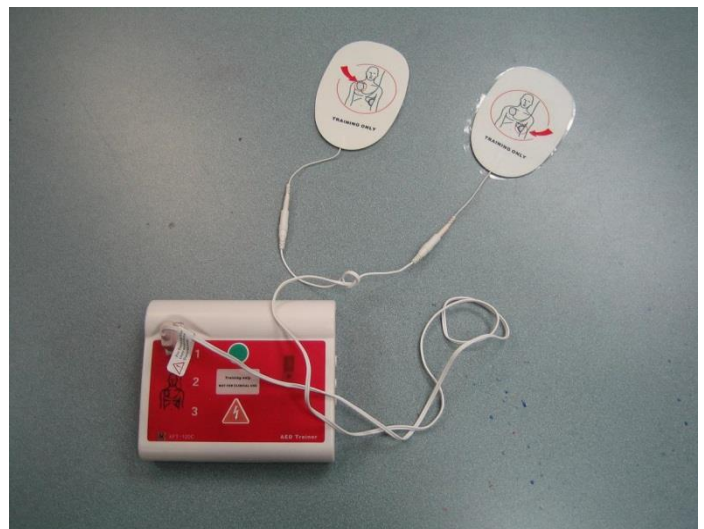


Figure 15: AED's are portable units that shock the heart if certain rhythms are detected.

When a shock is delivered to the heart, it will momentarily stop all electrical activity within it. This means that VT or VF will be terminated. When this occurs, it gives the heart's pacemaker, called the sinoatrial node, a chance to take command again. This will start the heart's normal pumping behavior.

It may take more than one shock for this to occur. However, an AED will only shock when VT or VF is present. A heart with a normal or no rhythm will not be shockable by an AED.

## The Importance of Time

Time is an important factor in surviving cardiac arrest. CPR should be started immediately to help prevent brain damage. Defibrillation must also be performed quickly. This is because the heart will only stay in *fibrillation* a short time before all electrical activity ends. Once this occurs, the heart is in asystole. AEDs will not shock asystole.

In addition, the longer a heart is in fibrillation, the greater amount of damage will occur to the heart muscle due to a lack of oxygen. Quick AED use means more muscle saved. Few cardiac arrest patients survive if defibrillation takes longer than 10 minutes.

## The Role of CPR in AED

In most cases, CPR won't start the heart alone but it is still very important. It keeps oxygenated blood circulating throughout the body and most importantly to the brain. It helps extend the length of time the heart is in fibrillation (and therefore available to be shocked with an AED). CPR, in essence, buys time. It is important that interruptions to CPR be minimized therefore, whenever possible, an AED should be applied by a second rescuer / provider.

## When to Use an AED

- when you realize someone is not breathing and CPR has been started
- AEDs can be used on adults, children and infants

## How to use an AED

- Turn the device on
  - Connect cables to AED
- Attach adhesive electrode pads to the casualty's chest.
  - Bare the chest (cannot attach pads to clothing, must be bare skin)
  - Shave the chest if necessary.
  - Dry the chest if necessary.
  - Peel away the protective plastic and attach electrode pads – one goes on the RIGHT upper anterior side of the casualty's chest just below the collar-bone and the other on the LEFT lower anterior chest wall just below the left nipple.
- Ensure no one is touching the casualty
- Allow the AED to check the casualty's heart rhythm (or push ANALYZE button if needed) and deliver a shock if needed.
- Follow the AED prompts. Once the machine has analyzed the heart rhythm, it will indicate whether a shock is required or not.
- Immediately after delivering 1 shock or after any "no shock advised" message, check for signs of breathing and circulation. If there are no signs of breathing and circulation resume CPR, beginning with chest compressions. After 5 cycles (about 2 minutes of CPR, let the AED analyze the rhythm. If prompted by the AED deliver another shock. If a non-shockable rhythm is detected, the AED should instruct the rescue to resume CPR immediately, beginning with chest compressions. Continue CPR unless you are too tired, someone relieves you, or the heart starts
- If signs of breathing and circulation are detected give rescue breathing without chest compressions (artificial respiration)

## Warnings and Cautions

Do not use an AED in the presence of flammable gasses (including concentrated oxygen) to avoid possible explosion or fire hazards.

To avoid serious electrical shock during defibrillation first aiders should:

- Not touch the casualty, unless CPR is indicated.
- Not touch metal objects in contact with the casualty

- Keep defibrillation pads clear of other pads or metal parts in contact with the patient

### **Possible interference with implanted pacemaker**

First aiders must look for a medic alert to find out if the casualty has an implanted pacemaker. The use of an AED should not be delayed for casualties with implanted pacemakers. However, when placing pads:

- Do not place the pads directly over an implanted device
- Place the pads at least one inch from any implanted device

### **When placing AED pads**

- Place pads firmly on clean and dry skin.
- Do not place pads over transdermal medication patches. Remove and clean area before placing pads.

### **Post-Resuscitation Care**

If defibrillation is successful and the victim regains a pulse they may begin to breathe on their own but stay unresponsive. In this case, place the casualty into the recovery position and monitor the vitals. Leave the AED attached as some machines will continually monitor heart rhythms. The device may be needed if the heart stops again.

### **AED's in the Workplace**

- **If an AED is supplied at your place of business, you are required**
  - To establish inspection and maintenance records for that device as per manufacturer's directions
  - Receive training on that specific make and model
  - Clearly label and train staff to its location
  - Incorporate AED response plans into your existing emergency response procedures
- **If an AED is not available at your workplace it is recommended**
  - H&S committee search and located the closest AED available to the worksite
  - Post and train employees to its location
  - Recommend to employer the need for an AED within 2 min of incident location



## **Where to Find AED's**

- Government Buildings
- Anywhere a lot of people meet (malls, airports, bus stations, train stations)
- Anywhere people exert themselves (gyms, pools, hockey rinks, community centers, fitness centers).
- They are becoming more popular in restaurants and hotels
- At your workplace, please check with your employer to go over policies and procedures

## Chapter 8

### Occupational Health and Safety

\*This information provided in this Chapter (Chapter 8) is provided directly through Alberta Labour. This material is to be used for information purposes only no warranty is implied or given as to the accuracy or the timeliness of the material presented.

- [Automated External Defibrillators in the Workplace](https://ohs-pubstore.labour.alberta.ca/fa015) (FA015) - <https://ohs-pubstore.labour.alberta.ca/fa015>
- [Developing a First Aid Plan](https://ohs-pubstore.labour.alberta.ca/fa012) (FA012) - <https://ohs-pubstore.labour.alberta.ca/fa012>
- [First Aid Records](https://ohs-pubstore.labour.alberta.ca/fa009) (FA009) - <https://ohs-pubstore.labour.alberta.ca/fa009> (*First Aid Record Form found here*)
- [Medication in First Aid Kits](https://ohs-pubstore.labour.alberta.ca/fa014) (FA014) - <https://ohs-pubstore.labour.alberta.ca/fa014>
- [Workplace First Aiders and Legal Requirements](https://ohs-pubstore.labour.alberta.ca/fa011) (FA011) - <https://ohs-pubstore.labour.alberta.ca/fa011>
- [Oxygen Equipment and Related Training Requirements at Worksites](http://ohs-pubstore.labour.alberta.ca/fa013) (FA013) – <http://ohs-pubstore.labour.alberta.ca/fa013> **\*For Advanced First Aid ONLY\***

### Contacting Work Safe Alberta for Additional Information

Province-Wide Contact Centre - Edmonton (780) 415-8690 2

The Occupational Health and Safety Contact Centre

☐ Throughout Alberta 1-866-415-8690 (Toll Free)

Deaf or hearing impaired

☐ Edmonton (780) 427-9999

☐ Other locations 1-800-232-7215 (Toll Free)

The Alberta Labour Occupational Health and Safety website at

<http://work.alberta.ca/occupational-health-safety.html> . You may access occupational health and safety information from this website.

Getting copies of OHS Act, Regulation & Code: Queen's Printer ☐ <http://www.qp.alberta.ca>

Edmonton (780) 427-4952 Occupational Health and Safety ☐

<http://employment.alberta.ca/SFW/295.html>

## Chapter 9

### Bone and Joint Injuries

Injuries can vary from minor to severe. Bone, joint, and muscle injuries are common in first aid. Few are life threatening but many can be painful and debilitating and may cause life-long complications such as disability for the victim. The focus of first aid for bone and joint injuries includes reducing the chance of negative long-term effects while making the injury more bearable.

#### Prevention:

- Keep a safe environment. Make sure equipment is all up to date.
- Keep alert and aware of your surroundings.
- Keep stairways clutter free and well lit
- Put child gates at top AND bottom of staircases if you have infants, children or pets.
- Minimize alcohol/drug/medication intake when performing tasks.
- Put non slip mats in kitchens, washroom and entrances.
- Clear snow on your sidewalks and walkways.
- Know the rules of the activity you are participating in.
- Be safe around ladders. Maintain a proper three point contact and with the use of a spotter.
- Obey all the rules of your workplace, sport, hobby or activity.
- Wear proper safety equipment (masks, helmets, knee or elbow pads, etc).
- Do proper stretching as advised by your doctor
- Do not overexert yourself.
- Be careful around water. Always enter feet first, never run around the pool. Try to always have a properly trained and licensed lifeguard when playing around water.

#### Bone injuries

Bones can fracture in one of two ways:

- Closed fractures – the skin over the fracture is not broken
- Open fractures – the skin over the fracture is broken, creating a risk of serious infection

More specific types of fractures also exist. However, it is not the first aider's responsibility to determine a broken bone's specific form.

- Depressed fracture – the skull is fractured inward
- Complicated fracture – a broken bone has caused damage to internal organs (e.g., broken rib)
- Transverse fracture – a bone is broken straight across
- Spiral fracture – a bone is broken by twisting
- Oblique fracture – a bone is broken on a steep angle
- Green stick fracture – bone is *not* broken straight through

### **Mechanism of Injury**

A fracture can be caused by direct force, a twisting force, or by an indirect force. Diseases which make the bones brittle, like osteoporosis, may also lead to breaks with little force at all.

### **Signs of a Fracture**

- Unnatural movement
- Deformity to limb
- Pain and tenderness
- A wound – a bone end may stick out
- Loss of function
- Shock
- Crepitus – a grinding sensation felt when broken ends of a bone rub together
- Swelling and/or bruising

### **Injuries to Joints**

A joint is where two or more bones come together. Joints may be injured when the bones and surrounding tissues are forced to move beyond their normal range. When a joint is overly forced:

- The bones may fracture
- The ligaments may stretch and tear (a sprain)
- The bone ends may move out of proper position (a dislocation)

## Sprains

A sprain is an injury to a ligament. There are different degrees of sprains.

- First-degree sprain: a stretched ligament
- Second-degree sprain: a partly torn ligament
- Third-degree sprain: a completely torn ligament

Always provide first aid as if the injury is serious. It is difficult to determine which degree of sprain a person has without the appropriate training. Sprains can also mimic breaks, so always seek medical attention.

### Symptoms of Sprains

- Pain that may be severe and increase with movement of the joint
- Loss of function
- Swelling and/or discolouration

## Dislocations

A dislocation occurs when the bones which comprise a joint no longer come into the proper contact. This stretches and tears the joint capsule holding the joint together. A dislocation might be caused by a severe twist of a joint or indirect force.

The elbow, shoulder, thumb, finger, lower jaw and knee are the most frequently dislocated. Outstretching one's arm upon a fall may result in a dislocated shoulder. Please note, a dislocated bone may put pressure on nearby blood vessels and cut off circulation or injure a nerve, furthering a serious complication of this injury.

### Symptoms of Dislocations

- Deformity or abnormal appearance
- Pain and tenderness triggered by movement
- Loss of normal function
- Swelling and/or bruising
- Feeling that the limb may 'fall off'

## First Aid for Bone and Joint Injuries

The focus of caring for bone and joint injuries is to prevent further tissue damage and reduce / limit the pain. To care for these injuries, this general approach is necessary:

- Begin ESM by ensuring the scene is safe. Assess the mechanism of injury. If you suspect a head or spinal injury, call for medical help immediately. Support the head before continuing.
- Do a primary survey and give first aid to any life-threatening injuries.
- Wear appropriate personal protective equipment
- Steady and support any obvious fractures or dislocations. Dress any wounds. Protect any protruding bones.
- Do a secondary survey. When you find a bone or joint injury, carefully and gently expose the injured area. This may mean cutting away clothing. Look for a wound (an open fracture). Check circulation above and below the injury. Medical help is urgent if circulation is impaired.
- Support the injured area. This can be achieved by you, a bystander, or the casualty themselves. Maintain support until help can take over.
- Decision – if medical help is on its way, just steady and support the injury. If medical help is delayed, immobilize the injury. Here are some considerations for this decision:
  - Are there other risks to the casualty? Are there risks to you?
  - How long will it take for medical help to arrive?
  - Do you have the materials necessary to immobilize the injury?
- Apply cold to the injury using the RICE method.
- Treat for shock.
- Give ongoing care until medical help arrives.

## The RICE Method

To treat most injuries to bones, muscles, or joints, use the RICE method:

**R**est

**I**mmobilize

**C**old

**E**levation

**Rest** – stop the activity that caused the injury and stay off it until a doctor permits it.

**Immobilize** – take steps to prevent movement of the injured limb. This may mean using a splint or sling.

**Cold** – apply cold to the injury as soon as it is immobilized. Cold narrows blood vessels which, in turn, reduce swelling, bruising, and pain. Apply cold over the entire injured area – 15 minutes on, 15 minutes off or until the area goes numb. Once numb remove cold. This could take a few minutes or longer than 15, make sure to communicate with you causality. Do not put ice directly on the skin.

**Elevation** – raise the injured part if possible. Only do so if it does not cause more pain or harm. Elevation helps reduce swelling and makes fluids easier to drain away from the injury.

**Use RICE when waiting for medical help to arrive or while transporting a casualty**

## Immobilizing a Collarbone

- Check circulation above and below the injury. If circulation is impaired, get immediate medical help.
- Immobilize the arm in the position of most comfort. A sling (Figure 16) may work best.
- Secure the arm to the chest with broad bandage to prevent movement to and away from the body.
- Check circulation above and below the injury. If circulation is impaired, and it wasn't before, loosen the sling and bandage.

## Immobilizing a Dislocated Shoulder

A dislocated joint will not usually move very easily. Movement will cause significant pain. Immobilize the limb in the position of greatest comfort. This is typically the position found.

- If the arm bends – use a sling to transfer the weight of the arm to the other side of the body. Place padding under the elbow on the side of the injury for comfort.



Figure 16; A sling may be used to help immobilize a collarbone injury.

Once the injury is immobilized, apply cold to reduce pain and swelling. Monitor circulation often. Compare the injured side to the non-injured side.

## Immobilizing an Open Fracture (Upper arm)

The following shows how to immobilize an open fracture of the upper arm. To immobilize a closed fracture, commence at step 3.

1. Expose the injury site. Cover the wound with sterile dressing and check circulation.
2. Pad and bandage the dressings. Bandage should not put any pressure on bone ends.
3. Immobilize the arm with a sling and broad bandages.

## Splinting

Splints are materials which prevent bones from moving unnecessarily. A good splint is:

- Rigid enough to support the injured limb above and below the injured area
- Well-padded for comfort
- Does not impair circulation
- Long enough
  - It extends beyond the joints above and below the fracture
  - For injured joints – it's long enough for the limb to be secured so the joint can't move

## Immobilizing a Closed Fracture of the Forearm

- Examine the injury and decide the best position for splinting (usually the position found). Do not reposition the injured limb. Have the casualty or a bystander support the injured arm as you prepare the supplies you need.
- Measure the splint against the uninjured arm for the appropriate fit if using a rigid splint that can be molded. Pad the splint for comfort.
- Once the splint is placed in position, have the casualty or bystander support it while you secure it using points above and below the injured area.
- Use an arm sling to support the lower arm and hand, preventing elbow movement.
- Check circulation below the last bandage by checking temperature of limb(s) and colour of nailbed(s) before and after applying a splint. Adjust if circulation is impaired.



- To avoid damaging nerves, blood vessels and tissues, DO NOT perform traction or manipulation.
- Give ongoing care. Get medical help.

## Immobilizing a Closed Fracture of the Wrist

- Examine the injury and decide the best position for splinting (usually the position found). Have a casualty or bystander steady and support the injured arm while you prepare the supplies required.
- Measure the splint to ensure its appropriate size. Pad the splint. Position the arm with as little movement as possible.
- Have a bystander or the casualty support the splint when it is in position so you can secure it.
- Use an arm sling to support the lower arm and hand, preventing movement of the elbow.
- Check circulation below the last bandage by checking temperature of limb(s) and colour of nailbed(s) before and after applying a splint. Adjust if circulation is impaired.
- To avoid damaging nerves, blood vessels and tissues, DO NOT perform traction or manipulation.
- Give ongoing care. Get medical help.



Figure 17: When splinting, it is important to support the injured leg above and below the injured area. The rescuer above is using a rigid splint to support the injured area.

## Immobilizing a Closed Fracture of the Leg or Knee

- If you suspect a fractured upper leg, have a bystander support the injured limb.
- Choose your splinting technique. It may be helpful to measure the splint against the uninjured leg.
- Use the splints to support the injured leg above and below the injured area. This is dependent on the length of your splint.
- Pad the splints for comfort.

- Check circulation below the last bandage by checking temperature of limb(s) and colour of nailbed(s) before and after applying a splint. Adjust if circulation is impaired.
- To avoid damaging nerves, blood vessels and tissues, DO NOT perform traction or manipulation.
- Give ongoing care. Get medical help.

## Immobilizing an Open Fracture of the Lower Leg (tibia or fibula)

Immobilize a closed fracture the same way you would an open fracture (described below) but without the dressings and bandages. Fractured lower legs are common in sports.

- Expose the injury. This is how you will discover the injury is an open fracture. A fracture is open when the skin is broken (the bone may stick out).
- Show a bystander how to steady the leg. Check the circulation above and below the injury. Give first aid for the open wound.
  - Cover the wound with a sterile dressing
  - The dressing should extend well beyond the edges of the wound
  - Leave the shoes (or boots) on. Only let medical professionals examine the wound.
  - Put bulky padding lengthwise on both sides of the fracture, over the dressing, to protect the bone end
  - Tie a broad bandage over the padding and dressing tightly enough to put pressure on the padding, but not tight enough to cut off circulation – check circulation below the injury once the bandage is tied.
  - Make sure there is no pressure on the bone ends
- Immobilize the lower leg. Position the bandages and splints.
- Tie the bandages starting at the thigh (the stable end) and work downwards. Also tie bandages around the ankles to prevent movement.
- Check circulation below the last bandage by checking temperature of limb(s) and colour of nailbed(s) before and after applying a splint. Adjust if circulation is impaired.
- To avoid damaging nerves, blood vessels and tissues, DO NOT perform traction or manipulation.
- Give ongoing care. Get medical help.

## Strains

A strain is the product of an overstretched or forcefully strained muscle or tendon. Strains can be mildly uncomfortable as well as disabling. It is difficult for a first aider to determine the degree of severity.

### Signs and Symptoms

- Sudden sharp pain in the strained muscle
- Swelling of the muscles causing severe cramps
- Bruising and muscle stiffness
- Casualty may not be able to use the affected body part

### First Aid for Strains

- Begin ESM by ensuring the scene is safe. Assess the mechanism of injury.
- Complete the primary survey. Ensure the casualty ceases the activity which led to the injury.
- Wear appropriate personal protective equipment
- Place the casualty in a comfortable position. Assess the injury. If there is loss of function, immobilize the injury as if you were treating a fracture (apply the RICE method).
- Treat for shock.
- Give ongoing casualty care. Get medical help.

## Chapter 10

### Head, Neck and Spinal Injuries

#### Prevention:

- Maintain a safe environment. Make sure equipment is all up to date
- Stay alert and aware of your surroundings.
- Keep stairways clutter free and well lit
- Put child gates at top AND bottom of staircases if you have infants, children or pets.
- Minimize alcohol/drug/medication intake when performing tasks.
- Putting non slip mats in kitchens, washroom and entrances.
- Clearing snow on your sidewalks and walkways.
- Wear your seatbelt
- Knowing the rules of the activity you are participating in.
- Being safe around ladders. Maintaining a proper three point contact with a spotter.
- Obey all the rules of your workplace, sport, hobby or activity.
- Wear proper safety gear (masks, helmets, knee or elbow pads, etc).
- Proper stretching as advised by your doctor
- Not over exerting yourself.
- Careful around water. Always enter feet first, never run around the pool. Try to always have a properly trained and licensed lifeguard when playing around water.

### Head Injuries

Any injury to the head that affects brain function is classified as a head injury. Head injuries are serious and include skull fractures, concussions and brain hemorrhage or compression. Brain injuries can also be complicated by unconsciousness. Fractures at the base of the skull can involve injury to the cervical spine. As a result, any suspecting head injury should warrant the first aider to suspect a neck injury. First aiders may refer to this incident as a Traumatic Brain Injury (TBI) which is an acquired brain injury caused by extreme force.

## Signs and Symptoms

The following are signs that show a possible fracture of the skull or facial bones, compression, or concussion:

- Deformed skull
- Fluid or blood coming from the nose or ears
- Bruising below eyes or behind the ears
- Nausea, vomiting, especially in children
- Confused, dazed
- Semi-conscious or unconscious
- Knocked-out teeth
- Swollen, bruised or bleeding scalp
- Very slow pulse rate
- Pupils are of unequal size
- Pain at the site of injury
- Pain when swallowing or moving the jaw
- Wounds in the mouth
- Paralysis
- Numbness
- Tingling
- Shock

## Skull Fractures

Direct or indirect force transmitted through the bones can lead to skull fractures. They may occur in the cranium, the base of the skull, or in the face. Facial fractures include the nose, the bones around the eyes, the upper jaw and the lower jaw. Fractures of the jaw are often complicated by wounds inside the mouth.

## First Aid for Head Injury

First aid for skull fractures depends on the fracture site and the signs. Remember, whenever there is a skull fracture, a spinal injury should be suspected and treated for.

- Begin ESM by ensuring that the scene is safe. Assess the mechanism of injury.
- Complete the primary survey.
- When you recognize that the casualty might have a head injury, tell them not to move and get medical help (Call 911). Manually stabilize the head and neck so that the head, neck and spine do not move and are kept in line (Figure 18). Have the casualty remain as still as possible while awaiting arrival of EMS providers.
- Wear appropriate personal protective equipment
- If blood or fluid is coming from the ear canal, secure a sterile dressing lightly over the ear, making sure fluids can drain.
- Protect areas of depression, lumps, bumps, or scalp wounds. Place compressible but soft dressing's bandages. Avoid pressure at the fracture site.
- Warn the casualty not to blow their nose if there is blood or fluid coming from it. Do not restrict blood flow. Wipe away external blood.
- Treat for shock.
- Give ongoing care and monitor level of consciousness until medical help can take control.
- Perform a secondary survey if EMS is delayed but do not move the casualty unless the environment is unsafe for the casualty and first aider. Maintain spinal motion restriction by manually stabilizing the head and neck (e.g., placing one hand on either side of the casualty's head to hold it still) so that the motion of the head, neck or spine is minimized, before turning or moving the casualty.



Figure 18: When rescuers suspect a head injury they should support the head as soon as possible.

## First Aid for Fractures of the Facial Bones and Jaw

- Begin ESM by ensuring that the scene is safe. Assess the mechanism of injury. Ensure EMS has been contacted. Complete the primary survey.

- Wear appropriate personal protective equipment
- If you suspect a head injury, tell the casualty not to move and get medical help. Steady and support the head with your hands as soon as possible.
- Check the airway and make sure there is nothing in the mouth. Remove any knocked out teeth or loose dentures and maintain drainage for blood and saliva.
- If there is no suspected head or spinal injury:
  - If the casualty is conscious place he / she in a sitting position with his / her head well forward to allow any fluids to drain freely. Support the jaw with a soft pad held in place by hand – do not bandage the mouth closed.
  - If the casualty cannot sit comfortably, place them in the recovery position
  - If the casualty is unconscious place him / her in the recovery position. If the casualty vomits support the jaw with the palm of your hand and turn the head to the uninjured side.
- Get medical help and give ongoing casualty care. Check the casualty's level of consciousness and vital signs often.
- Treat for shock.

## Concussion and Compression

A concussion is a temporary disturbance of brain function commonly caused by a blow to the head or neck. The casualty may become unconscious but usually for only a few moments. Traffic collisions, sports injuries, and falls are common sources of concussions.

### Signs and Symptoms of Concussion

- Partial or complete loss of consciousness, even for a brief period of time.
- Casualty indicates that they were "seeing stars"
- Shallow breathing
- Nausea and vomiting when regaining consciousness
- Loss of memory of events immediately preceding and following the injury

A *compression* is a condition of excess pressure on some part of the brain. It may be caused by a buildup of fluids inside the skull, or by a depressed skull fracture where the broken bones are putting pressure on the brain. Compression is a form of elevated intracranial pressure. It is very important to monitor a casualty's vital signs and look for other symptoms when you suspect a compression.



## Signs and Symptoms of Compression

- Decreasing level of consciousness
- Unequal size of pupils
- Unconsciousness from the time of injury
- Nausea and vomiting
- Unusual hand placement, i.e. Arms curling into the chest or splayed outwards.

## Ongoing Care for Head Injury

Always suspect a neck injury when a blow to the head occurs. Tell the casualty not to move. Support their head and take precautions for a neck injury.

While a person may appear to recover rapidly from a concussion, serious injury is always a significant threat. Tell the casualty to seek medical attention right away for a complete evaluation.

## Spinal Injuries

A spinal injury can occur in any area along the length of the spine. Spinal injuries are very serious due to the possibility of damage to the spinal cord which runs through it.

Spinal cord damage can lead to loss of feeling and possible paralysis below the point of injury.

Always assess any emergency situation for the possibility of a spinal injury.

Spinal injuries are challenging to determine. Rely on the history of the scene, including the mechanism of injury. If the MOI suggests a spinal injury, manage the casualty accordingly.

### Signs and Symptoms

- Swelling and/or bruising at the site of the injury
- Numbness, tingling or a loss of feeling in the arms and legs on one or both sides of the body
- Severe pain at the injury site

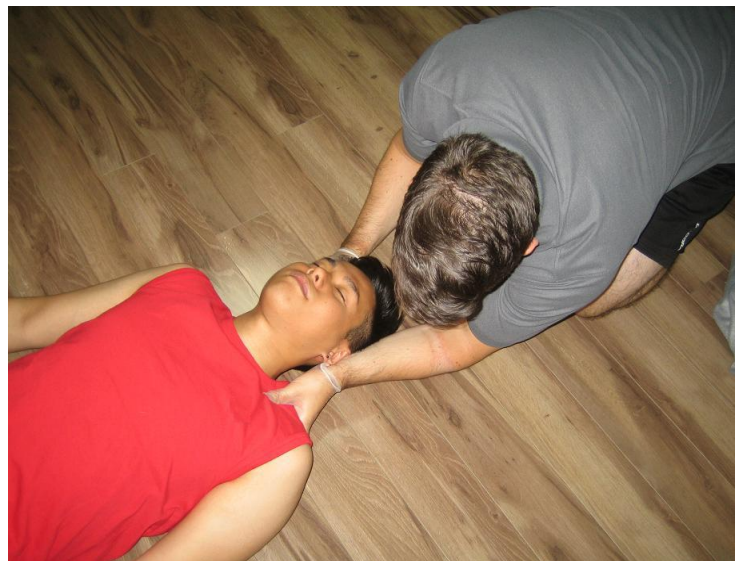


Figure 19: When steadying the casualties head keep your elbows on the ground to provide more stable support.



- Not able to move arms and/or legs on one or both sides of the body
- Signs of shock.
- Pin point tenderness.
- Blood or clear fluid coming from the eyes, ears, or nose.
- Seizures.
- Nausea or vomiting.
- Numbness, tingling or loss of feeling in any part of the body.
- Bruising around the eyes or behind the ears.
- Loss of bowel control.

### **First Aid for a Spinal Injury**

- Begin ESM by ensuring that the scene is safe. Assess the mechanism of injury.
- Complete the primary survey and have a bystander contact EMS.
- Tell the casualty not to move if you suspect either a head or spinal injury.
- Wear appropriate personal protective equipment
- Manually stabilize the head and neck so that the head, neck and spine do not move and are kept in line (Figure 19). Have the casualty remain as still as possible while awaiting arrival of EMS providers.
- Perform a secondary survey if EMS is delayed but do not move the casualty unless the environment is unsafe for the casualty and first aider. Maintain spinal motion restriction by manually stabilizing the head and neck (e.g., placing one hand on either side of the casualty's head to hold it still) so that the motion of the head, neck or spine is minimized, before turning or moving the casualty.
- Decide whether it is necessary to transport the casualty. This is not necessary if medical help is coming. Simply support the casualty in this case.
- Treat for shock.
- Give ongoing care and monitor level of consciousness until medical help can take control.

### **Immobilizing a Fractured Pelvis**

Any indication of a fractured pelvis should also lead to concerns of a possible spinal injury. With a suspected fractured pelvis first aid for the casualty will be almost identical to that of a spinal injury.

## Signs and Symptoms of a Pelvic Injury

- Signs of shock
- Urge to urinate
- Casualty cannot stand or walk
- Sharp pain in the small of the back and groin
- Increased pain
- Grinding sound when touching the hip area
- Deformed hip area
- Bruising

## First Aid for a Fractured Pelvis

- Ensure the scene is safe. Assess the mechanism of injury. Have a bystander for EMS/911.
- Wear appropriate personal protective equipment
- Complete the primary survey.
- Support and stabilize the casualty (using steps from the spinal injury section above).
- Give comfort and reassurance while performing a secondary survey.
- Treat for Shock
- Provide continual care until EMS arrives.

## Bleeding from the Scalp

Even with a minor cut on the scalp heavy bleeding is commonly involved. Numerous blood vessels are located close to the skin on the scalp which can create the heavy bleeding.

## First Aid for Bleeding from the Scalp

- As always begin ESM by evaluating the scene for safety
- Complete the primary survey.
- Contact EMS and assess the mechanism of injury.
- Wear appropriate personal protective equipment.
- Support the neck or head in case of a suspected head or neck injury.
- Do a primary survey of the casualty and give first aid to the most threatening injuries if there are several.
- To control severe bleeding, apply direct pressure to the wound as quickly as possible.

- Place the casualty at rest.
- Continue direct pressure over the dressings.
- Continue your survey, looking for other life threatening injuries.
- Check circulation around the wound before bandaging.
- Bandage the dressing in place.
- Apply ice to the wound
- Check circulation to see if your bandage requires adjustment.
- Treat for shock
- Give ongoing care until EMS are available.
  - Do not remove dressings but place additional dressings on top of current dressings

## First Aid for Bleeding from the Ears

- As always begin ESM by evaluating the scene for safety
- Complete the primary survey.
- Contact EMS and assess the mechanism of injury.
- Wear appropriate personal protective equipment.
- Support the neck or head in case of a suspected head or neck injury.
- Do a primary survey of the casualty and give first aid to the most threatening injuries if there are several.
- If other injuries permit, position the casualty in a lateral side-lying recovery position with the affected ear down so that fluid can drain from the ear.
- DO NOT block any drainage coming from the ear
- DO NOT try to clean or wash the inside of the ear canal
- DO NOT put any liquid into the ear or reach inside the ear canal with tweezers.
- Continue your survey, looking for other life threatening injuries.
- Treat for shock
- Give ongoing care until EMS are available.

# Chapter 11

## Chest Injuries

Chest injuries can be opened or closed. *Open chest injuries* occur when the skin has been broken. *Closed chest injuries* occur when the skin of the chest has not been broken and there may be no visible signs of injury. Chest injuries may result in serious damage to the ribs, lungs, heart, sternum, or nerves that control breathing. Car accidents are common causes of chest injuries as casualties come into contact with steering wheels or dashboards.

### Pneumothorax

A pneumothorax results when air gets into the chest cavity. This can cause one or both lungs to collapse which is a life-threatening emergency. If air is getting into the chest cavity through a wound this is called a *penetrating chest wound*. This is observable through blood stained air bubbles around the wound when the casualty exhales. In this case, first aid is needed immediately.

### Hemothorax

Hemothorax involves blood filling up the lungs. This is a life threatening injury and needs immediate medical attention. This can cause one or both lungs to collapse which is a life-threatening emergency. If the casualty exhibits pale, cool and clammy skin with unequal chest rising then first aid is needed immediately.

#### First Aid for Penetrating Chest Wound (Pneumothorax or Hemothorax)

- Begin ESM by ensuring the scene is safe. Assess the mechanism of injury.
- Have a bystander call EMS/911 immediately.
- Complete the primary survey.
- Wear appropriate personal protective equipment
- As soon as you identify a penetrating chest wound, cover it. Press the casualty's hand, a bystander's hand, or your gloved hand over the wound. This will help stop air flow.
- Place the casualty in a position whereby they can breathe the easiest. This is usually semi-sitting.

- Leave chest wounds open. If a dressing and direct pressure are required to control bleeding care must be taken to ensure that the dressing does not become occlusive and seal the chest wound. The open side of the dressing needs to be facing downward.
- Assess breathing. If breathing is still ineffective, give assisted ventilations if you are trained to do so.
- Treat for shock.
- Give ongoing casualty care. Monitor breathing. Note: if breathing becomes more difficult, a *tension pneumothorax* may be developing.

## Flail Chest

A flail chest results when several ribs in the same area are broken in more than one place. The injured part of the chest wall is called a *flail* or *loose segment*. The flail segment is not a rigid part of the chest wall. It will not move normally during breathing. As the casualty inhales, the chest should expand, but the flail segments is pulled into the chest instead. As the casualty exhales, the chest should move inward, but the flail segment puffs outward. First aiders should suspect a head and spine injury. Rescuers should also be aware of the possibility that the lungs, expanding around the sharp and broken bones, can cause a puncture wound. The first aider's job is to keep the broken ribs in line with the good ribs.

### Signs and Symptoms of a Flail Chest

- Bruising at the injury site
- Breathing is very painful
- Flail segment puffs outward instead of inward during exhaling (paradoxical chest movement)

### First Aid for a Flail Chest

- Begin ESM by ensuring the scene is safe. Assess the mechanism of injury.
- Have a bystander call EMS/911.
- Wear appropriate personal protective equipment.
- Complete the primary survey.
- Tell the casualty not to move.
- Steady and support the neck.
- Give first aid for ineffective breathing if required.
- Check circulation.

- Give ongoing care and monitor ABCs often until medical help takes control.
- Treat for Shock

## Rib Fracture

### Signs and Symptoms of a Rib Fracture

- Shallow breathing
- Pain at the injury site
- Deformity and discolouration
- Casualty may show signs of shock
- A wound on or near the rib area
- Casualty may cough up frothy blood if lung is punctured

### First Aid for Rib Fractures

- Ensure the scene is safe. Assess the mechanism of injury. Complete the primary survey.
- Have a bystander call EMS/911.
- Complete the primary survey.
- Expose the chest and examine for injuries.
- If the casualty has difficulty breathing, place them in a semi-sitting position, leaning slightly toward the injured side.
- Support the arm of the injured side into a sling.
- Treat for shock.
- Give ongoing care.

## Chapter 12

### Eye, Ear, and Nose Injuries

Wearing appropriate protective equipment, such as safety glasses or facial shields, are good practices towards preventing eye injuries. Protective eyewear is essential to prevent eye injuries from dangerous chemicals, sporting equipment (e.g., balls, sticks), sunlight, and other bright lights (e.g., welding flash).

#### Assessing the Eye

In a normal and uninjured eye, the entire circle of the iris should be visible. The pupils should be round, equal in size and react equally when exposed to light. Both eyes should move in the same direction when following a finger.

#### Wounds to the Eye

The eyes are one of the most delicate organs in the body and can be injured easily. Prompt first aid can prevent partial or complete loss of eyesight after an injury. Always assess the eyes for equal gaze (eyes appear the same and move in the same direction). Check the pupil shape and response to light. Check for presence of a foreign body and for fluid / blood draining. Never attempt to open the eyes if swollen shut.

#### Signs and symptoms include:

- red, watery or inflamed eye/s
- pain, burning
- impaired vision, double vision

#### Particles in the Eye

Grit, sand, or eyelashes can irritate the eye and cause inflammation. Irritation, often uncomfortable, is associated with eye pinkness. Often, natural tears will be enough to remove the particle.

### **First Aid to Remove Eye Particles (Upper Eyelid)**

- Begin ESM by ensuring the scene is safe.
- Wear appropriate protective equipment.
- Complete the primary survey
- Have the casualty try to blink the particle out. If that does not work then try to have him or her produce tears to flush it out. If this does not work then use a workplace approved eye wash station. If an eye wash station is not available then use clean tap water. If the irritant is still in the eye then seek medical attention.
- Treat for shock.

### **First Aid for Particles that cannot be Removed**

- Begin ESM by ensuring the scene is safe. Assess the mechanism of injury. Have a bystander call EMS/911.
- Wear appropriate protective equipment.
- Complete the primary survey.
- Warn the casualty not to rub the eye. This may cause more damage and / or irritation.
- Treat for shock.
- Give ongoing care and get medical help.

## **Wounds to the Soft Tissue Around the Eye**

Wounds around the eye may cause injury to the eyeball. A blow from a blunt object may cause bruises or broken bones that surround the eye. These blows may rupture blood vessels and damage internal structures of the eye. This may lead to loss of vision. Wounds from sharp objects are more difficult to manage because they can cause both internal damage and pose the risk of infection.

### **Lacerations and Bruises around the Eye**

Lacerated eyelids usually bleed profusely. A dressing to the area will slow bleeding. First aiders should never apply pressure to the eyeball. This can cause permanent damage to the eye.



## **First Aid for an Embedded Object in or near the Eyeball**

- Begin ESM by ensuring that the scene is safe. Have a bystander call EMS/911.
- Wear appropriate protective equipment.
- Complete the primary survey.
- Lay the casualty down and have a bystander support their head to reduce movement if one is available.
- Place a dressing around the embedded object. Place padding or dressing around the object in a “log cabin” fashion. This will stabilize the object.
- There are different ways to hold the dressings in place to prevent movement. If available, a drinking cup can be a good tool to hold the dressing in place and protect the object.
- Always cover both eyes
- Focus on minimizing head movement. Give ongoing care until medical help arrives.
- Treat for shock.

## **First Aid for an Extruded Eyeball**

- Begin ESM by ensuring that the scene is safe. Assess the mechanism of injury. Have a bystander call EMS/911.
- Wear appropriate protective equipment.
- Complete the primary survey.
- Lay the casualty down and, if available, have a bystander support the head to reduce movement.
- Gently cover the eyeball and socket with a moist dressing. Hold this in place with tape and more dressings, or use the cup and ring pad bandage (as in the previous scenario).
- Suspect head and back injuries and give appropriate care. Remember to cover both eyes and treat for shock.
- Give ongoing care until medical help can take over.

## **Signs and Symptoms for Chemical Burns to the Eye**

- Burning, pain, irritation
- Loss of vision
- Redness, swelling
- Visual damage to the eye and skin on the face

## **First Aid for Chemical Burns to the Eye**

- Begin ESM by ensuring that the scene is safe. Assess the mechanism of injury.
- Wear appropriate protective equipment.
- Complete the primary survey.
- Sit or lay the casualty down. Tilt the head back and turn it slightly to the injured side. If only one eye is injured, protect the uninjured eye while you work. Consult SDS sheet for the specific chemical. If the chemical is unknown then call EMS/911. Package the chemical if possible in case they need to test it. If SDS is present then follow the procedures outlined by the SDS sheet.
- If the chemical is a dry powder, brush away what is left on the skin (if told to do so by SDS or poison control).
- Flush the affected eye/s with copious amounts of sterile saline solution / water for a minimum of 15 minutes. Take care to protect the uninjured eye and prevent irrigation fluid from running into it then try to identify the substance and if possible send a copy of the Safety Data Sheet (SDS) with the casualty to medical care. Do not delay care to remove contact lenses.
- Avoid contaminating yourself
- Always cover both eyes even if only one is injured.
- Consider potential of inhalation injury
- Treat for shock.
- If access to SDS send a copy with the casualty and if at work fill out all first aid records

## **SDS Sheets**

Alberta OH&S requirements state that if any designated substance is used, stored or manufactured at or on a work site, the person responsible for that work site shall compile a written report with respect to that designated substance containing the information and in the form prescribed by a Director of Occupational Hygiene. This information shall be maintained on a worksite in a location that is readily accessible to the workers and to other persons who are at that work site.

## **Light Burns to the Eye(s)**

Intense light like direct sunlight or a welder's flash/arc flash can cause eye burns. Like a sunburn, the casualty may not feel the tissue damage occurring. However, they will develop symptoms several hours later.

## **Eye Burn Signs and Symptoms:**

- Pain (often severe)
- Sensitivity to light
- A gritty feeling in the eyes
- Redness of the eye
- Tearing

First aid should be conducted as follows:

- Begin ESM by ensuring that the scene is safe. Assess the mechanism of injury.
- Have a bystander call EMS/911.
- Wear appropriate protective equipment.
- Complete the primary survey.
- Do not delay care to remove contact lenses
- Cover and secure dressings over both eyes to protect the eyes from light (eye patches may be used) or cool wet (saline solution) compress for pain relief
- Give ongoing care until medical help arrives.
- Treat for shock.

## **First Aid for blood or fluid coming out of the ear**

If you see blood or fluid coming out of the ear this person should be referred for assessment by a medical professional, urgently if it the result of an injury.

- Begin ESM by ensuring that the scene is safe. Assess the mechanism of injury
- Wear appropriate protective equipment
- Complete the primary survey
- Assess the blood coming from the ear. If it is mixed with clear fluid, this can be a sign of a head injury. Secure a sterile dressing lightly over the ear, making sure fluids can drain
- If suspected head or spinal injury, support the head in position found
- If conscious put casualty in comfortable position which allows fluids to drain. If unconscious and breathing (no suspected head and spinal) move casualty to recovery position with injured side down
- Give ongoing/continual care.

## First Aid for Nosebleed

Nosebleeds can start for many reasons. It could be due to a sinus cold, head injury, blowing of the nose, injury to the nose and indirect injury to the skull. When you notice someone has a nose bleed you should

- Begin ESM by ensuring that the scene is safe. Assess the mechanism of injury
- Wear appropriate protective equipment
- Complete the primary survey
- Assess the blood coming from the ear. If it is mixed with clear fluid, this can be a sign of a head injury.
- If no suspected head injury get casualty to sit in a comfortable position and lean forward. This allows the blood and fluid to drain through the nose and mouth instead of going down the back of the throat to cause coughing or vomiting.
- Ask casualty to apply pressure to the cartilage portion of the nose right below the bridge by using thumb and index finger pressing firmly. Keep pressure on it for approximately 10 minutes or until bleeding stops.
- Remind casualty to breath from mouth during this time and not the nose. If bleeding doesn't stop in 10 minutes or starts again right away go seek medical attention.

## Chapter 13

### Poison, Bites, & Stings

A poison is defined as *any* substance which can cause death or illness when absorbed by the body. Products deemed poisonous will be marked with a poison symbol. However, some substances don't have warnings such as alcohol and household plants. In addition, some substances are not harmful in small amounts but can be poisonous in larger amounts.

#### Types of Poisons

There are four types of poisons. They are segmented based on how they enter the body:

Swallowed poisons – through the mouth

Injected poisons – through a hollow needle or needle-like device

Inhaled poisons – through the lungs

Absorbed poisons – through the skin or mucous membranes

Before calling the Poison Control Center, the first aider should focus on gathering as much information as quickly as possible.

#### History of the Scene

Four valuable pieces of information are required in order to provide appropriate first aid for poisoning:

- What poison was taken – the container will provide this information
- How much poison was taken – estimate the quantity based on what you see or are told
- How the poison entered the body – first aid can be different according to its entry
- When the poison was taken – the length of time the poison has been in the body

## **Prevention**

- Never handle any chemical that is not labeled
- Read and know the SDS for the chemical you are working with.
- Keep your WHMIS training up to date and know the location of SDS sheets.
- Always work in areas with good ventilation.
- Make sure to keep items in original containers with appropriate labels. If in industrial situations (drums to smaller containers) then use appropriate containers and affix applied labels.
- Handle chemicals with appropriate safety gear
- Be aware of your surroundings when entering unfamiliar territory
- Dispose of expired medicines at your local pharmacy

## **Signs and Symptoms of Poisoning**

All poisons may affect consciousness, breathing, and/or circulation. The symptoms vary depending on how the poison entered the system:

- Swallowed – symptoms include nausea, abdominal cramps, diarrhea and vomiting. In addition, the casualty may experience discolour of the lips, burns in or around the mouth or have a unique odour on the breath.
- Absorbed through the skin – blisters, swelling, burns, and a reddening of the skin
- Injected through the skin – irritation at the point of entry, possible allergic or behavioral reaction
- Inhalation – breathing problems. Symptoms may also include coughing, difficulty breathing, and chest pain. Depending on the poison, casualty may experience headache, dizziness, unconsciousness, or even cardiac arrest.

## **General First Aid for Poisoning**

- Begin ESM by ensuring that the scene is safe.
- Wear appropriate protective equipment.
- Gather information about the suspected poison. Assess casualty's responsiveness.
  - Responsive – call the Poison Control Center or hospital emergency department
  - Unresponsive – Call EMS/911 immediately

- Complete the primary survey. If breathing has stopped, commence CPR with respirations only if using a pocket mask. In doing so, check for poisonous material around the casualty's mouth. If no pocket mask is available then do compression only CPR.
- Place the unconscious breathing casualty into the recovery position.
- Give ongoing care until medical help can take over.
- Treat for shock.

### **First Aid for Swallowed Poisons**

- Begin ESM by ensuring that the scene is safe.
- Have a bystander call EMS/911.
- Wear appropriate protective equipment.
- Complete the primary survey.
- If the casualty is conscious, wipe poisonous or corrosive residue from the casualty's face and rinse or wipe out the mouth (if advised by Poison Control Center)
- Never induce vomiting unless instructed to do so by your Poison Control Center. Poisons can cause more damage when vomited.
- Treat for shock.
- Give ongoing care and give the container of poison to the ambulance if you have it.
- Note: Do not dilute a poison (by giving fluids) unless instructed by Poison Control Center.

### **First Aid for Inhaled Poisons**

- Begin ESM by ensuring that the scene is safe. Assess hazards with particular attention to the possible presence of poisonous gas or vapour. Never risk your own safety to help someone else. Have a bystander call EMS/911.
- Wear appropriate protective equipment.
- Inhaled poisons should be cleared from the lungs as quickly as possible. Move the person to fresh air, away from the poisonous source.
- If the casualty is unresponsive, call for medical help immediately.
- Do a primary survey and give first aid for the ABCs. If breathing is not present, begin CPR with a face mask with one way valve. If no mask is present then do compression only CPR.
- If the casualty vomits, keep the airway open by putting them in the recovery position.
- Treat for shock.
- Give ongoing care until medical help arrives.

## First Aid for Absorbed Poisons

Most poisons are not absorbed by the skin. Typically only skin irritation results and the rest of the body is unaffected. This is called *contact dermatitis*, exemplified by redness, itching and blisters.

However, some chemicals may affect the rest of the body when absorbed by the skin and can cause a life-threatening situation.

- Begin ESM by ensuring that the scene is safe.
- Wear appropriate protective equipment.
- Complete a primary survey and give first aid for life-threatening injuries.
- Consult SDS sheet and provide appropriate care.
- If no SDS is available then contact EMS/911.
- Remove any clothing that has been in contact with the poison. Don't directly touch the clothing until it has been thoroughly washed. Try not to touch the affected part of the body to any other part of the body. If WHMIS indicates to dispose of the clothing then put in a biohazardous bag then throw it away.
- Give ongoing care until medical help takes over.
- If consciousness or breathing is affected then always call EMS.
- Treat for shock.

## First Aid for Injected Poisons

You should follow the *general first aid for poisoning* for injected poisons. Injected poisons should be contained near the injection location. By keeping the casualty at rest and the affected limb below heart level, you can delay the circulation of the poison through the body. If you have been pricked with a possible HIV infected needle or similar transmissible disease, the site of the injury should be gently washed with soap and water or as instructed by your doctor.

## Bites and Stings

### Animal and Human Bites

Bites from either animals or humans can cause wounds or lacerations that can carry contaminated saliva into the body. Bites are dangerous for their risk of infection. Bats, foxes, skunks, and raccoons



can carry the rabies virus which can be fatal if left untreated. Always provide first aid assuming that the animal delivering the bite had rabies.

### **First Aid for Animal/Human Bites**

- Begin ESM by ensuring that the scene is safe. Never enter an area if the dangerous animal (or human) is not controlled. Do not attempt to capture the animal. If it is safe to do so then you can contain the animal and let Animal Control capture the animal.
- Wear appropriate protective equipment.
- Complete a primary survey and give first aid for any life-threatening conditions.
- Examine the wound to see if the skin was broken.
- If there is bleeding, allow moderate bleeding to occur as this helps to clean the wound. If serious bleeding then always apply pressure and call EMS.
- Wash the wound with an antiseptic soap or detergent. Apply a dressing and a bandage.
- If the skin was broken, get medical help as soon as possible.
- Treat for shock.

## **Snakebites**

The only poisonous snake found in nature in Canada is the rattlesnake (exotic pets not included). It can be found in British Columbia, Alberta, Saskatchewan, and Ontario but they are not common and snakebites are rare.

A rattlesnake bite leaves one or two punctures to the skin. Venom is usually injected into the casualty. The venom will leave the casualty with a burning sensation followed by swelling, severe pain, weakness, discolouration, sweating, nausea, vomiting and chills. For all snakes, do not provoke them in the first place. Snakes are not actively hunting for humans. The best way to prevent is to avoid contact with snakes in the first place.

### **First Aid for a Snakebite**

- Begin ESM by ensuring that the scene is safe. Make sure there is no danger of a second snakebite to either you or the casualty.
- Wear appropriate protective equipment.
- Complete the primary survey.

- Place the casualty at rest but keep the affected limb at heart level. This is to balance the risks of worsening the injured part with the risk of systemic spread of toxin.
- Flush the bite with soapy water. Do not apply a cold compress.
- Remove any rings, watches or tight clothing.
- Immobilize the limb for a fracture.
- Treat for shock.
- Give ongoing casualty care until medical help arrives.
- Don't do what they do in the movies (amputations, sucking the poison out, tourniquet, etc)

## **Insect Bites and Stings**

Some people are severely allergic to certain insect stings. As a result, being stung can be a life-threatening situation. Be sure to ask the casualty if they have ever had an allergic reaction to a sting before. If you suspect an allergic reaction, give them first aid for a severe allergic reaction.

### **Signs and Symptoms at the Site of a Bite or Sting**

- heat
- swelling
- redness
- sudden pain
- itching
- A hole in the skin where the bite happened.
- Rash

### **Signs and Symptoms of a severe Allergic Reaction to a Bite or Sting**

- general swelling – especially of the airway
- general itching, rash
- bumps on the skin that may be white, pink, reddish or blotchy (hives)
- weakness or fainting
- headache
- fever
- breathing difficulties
- anxiety, abdominal cramps, vomiting
- A high pitched noise upon inhalation (stridor).

## First Aid for an Insect Bite or Sting

- Begin ESM by ensuring that the scene is safe.
- Wear appropriate protective equipment.
- Do a primary survey and give first aid for the ABCs.
- Examine the sting closely. Look for a stinger that may be still attached to or in the skin. If you find it, remove it by scraping it from the skin (in a motion away from the body if possible). Avoid using tweezers. This may result in inadvertently squeezing more poison from the stinger into the body.
- For serious reactions that affect breathing or cause swelling of the airway, assist the casualty to take their medication (e.g., an EpiPen) then call EMS/911. Do not prescribe or tell the casualty what medicine to take unless you are a doctor, paramedic or have written power of attorney over the patient.
- Treat for shock.

## Ticks

Ticks are common in Canada and found mostly in forests, deep dry grass, or bushes. They drop from foliage onto animals and humans. They then bite through the skin and anchor themselves to the tissue with barbed mouth parts. A tick sucks the host's blood for hours and can become large. When they are done sucking, the tick detaches and drops off.

The diseases commonly found in ticks can be harmful such as Lyme disease. If you find a tick on the body it should be removed. If you find one, check your body for others.

## Prevention

- Wear light colored, long sleeve tops and long pants so it will be easier to spot ticks
- Tuck your shirt into your pants, tuck your pants into your socks and tape up your sleeves.
- Inspect your pets before allowing them inside your house.

## Signs and Symptoms of Lyme Disease:

- "Bulls eye" up to 6 inches in diameter. Normal skin color with red circles.
- Memory loss, arthritic pain, problems seeing and hearing.
- Flu like symptoms

## First Aid for Bites From Ticks

- Begin ESM by ensuring that the scene is safe.
- Wear appropriate protective equipment.
- Conduct a primary survey. Remove the embedded tick. To do so, grasp it as close to the casualty's skin as possible and pull away from the skin with even and steady pressure. Avoid squashing an engorged tick during removal. Infected blood can spray into your eyes or mouth or land on an exposed cut on your skin. If you do not have tweezers, remove the tick with gloves or a plastic bag or tissue paper.
- Keep the dislodged tick in a Ziploc bag and bring it to medical help for identification.
- Clean the area with soap and water to prevent infection. Wash your hands.
- Ticks can carry Lyme Disease or Rocky Mountain Spotted Fever.
- Lyme Disease can be treated better if it is spotted sooner.
- Treat for shock.

## Leeches

You can come across leeches in ponds, swamps, lakes and stagnant water. Some feed on the warm blood of animals and humans. A leech makes a small cut in the skin which is difficult to feel at the time. Next, it attaches itself and feeds on the blood. Leeches can carry bacteria that can be regurgitated into the host if heat or chemicals are applied.

### First aid for lesions from leeches

- Begin ESM by ensuring that the scene is safe
- Wear appropriate protective equipment
- Complete a primary survey.
- Detach the leech by first using a clean and flat surface to push the head end of the leech off of the skin. It is important to note that the head end is the smaller, skinner part of the leech and NOT the larger end. Next, push the larger end off with the clean and flat object.
- You will observe some bleeding upon removal due to the anticoagulant used by the leech for feeding. Cleanse the wound and apply a dressing if necessary.
- Treat for shock.
- If the bite area shows signs of infection in the next 7 days, seek medical help.

## Chapter 14

### Medical Conditions

#### Diabetic Emergency

Diabetes is a condition in where there is not enough insulin in the blood or there is enough insulin yet the cells cannot use the insulin properly. Because of this, sugar accumulates in the blood and cells do not obtain the energy they need. A person with diabetes takes medication (oral or injected) and may need to watch what they eat and their level of exercise. A diabetic emergency results from either too much or too little insulin in the blood.

Hypoglycemia – not enough sugar in the blood, too much insulin or medication

Hyperglycemia – too much sugar in the blood, not enough insulin

First aiders do not need to know the difference between hypoglycemia and hyperglycemia in order to determine which first aid protocol to follow. Focus on identifying the situation as an emergency and recruiting medical help promptly.

First Aiders may assist with medication in cases where an individual is unable to take his or her own medication without assistance\*. This medication does not include over the counter medications, only prescription medications of a life-saving nature.

\*For Alberta, please refer to the document titled "Medication in first aid kits" given at the start of the course.

<b>Hypoglycemia (sugar needed)</b>	<b>Hyperglycemia (insulin needed)</b>
Develops quickly (Minutes to hours)	Develops slowly (Days to weeks)
Caused by taking too much insulin, not eating enough, or more exercise than normal	Caused by not taking enough insulin, eating too much food, or under-exercising
Inability to focus	Deep breathing
Shallow breathing	Drowsy, becoming unconscious
Faintness	Fruity smell on the breath

Acting violent or drunk	
Strong pulse (HCP Only)	Weak, rapid pulse (HCP Only)

### First Aid for Diabetic Emergencies

- Begin ESM by ensuring that the scene is safe.
- Wear appropriate protective equipment.
- Complete the primary survey. Also check for a medical alert bracelet.
- If conscious, able to follow commands and casualty verifies she / he is diabetic, assist him / her to take their glucose tablets or sugar. Administration of glucose may be repeated if symptoms persist after 10 minutes. If the casualty does not have glucose tablets other types of dietary sugars are recommended. Some examples are glucose candy (e.g., Mentos®), sucrose candy (e.g. Skittles®), jelly beans, orange juice, fructose (fruit leather), whole milk. Low calorie / diet beverages should be avoided.
- If unconscious, place casualty in the recovery position and monitor them until medical help takes over. If the casualty is *conscious*, ask what is wrong. They might be able to tell you (but they may also be confused).
  - If the casualty can tell you what they need, assist them to take what is needed (e.g., sugar or juice).
  - If the casualty is confused about what is needed, give them something sweet to eat or drink. It can only help and cannot make their condition worse.
  - If they do not feel better after the sugar then call EMS/911 (within a few minutes)
- Give ongoing care until EMS arrives.
- Conduct a secondary survey
- Treat for shock.

## Seizures and Convulsions

A *seizure* is caused by abnormal electrical activity in the brain. A *convulsion* is an abnormal muscle contraction that the person cannot control.

There are both partial and generalized seizures. When someone experiences a partial seizure only part of the brain is affected and the signs and symptoms will be minimized to one area of the body. This could show up as twitching or tingling etc. in one area of the body. A generalized seizure affects the entire body as the whole brain is affected. This would present as someone losing consciousness and having convulsions.



Figure 20: During a seizure rescuers should ensure the casualty's movements are not restricted and should try to prevent the head from getting injured.

*Epilepsy*, for instance, is a disorder characterized by seizures. Other causes of seizures can be head injuries, brain infections, stroke, drug overdose, or high fever in children or infants.

People with epilepsy may feel a seizure is about to happen because of a brief feeling called an *aura*. The aura, which might be a hallucinated sound, smell, or a feeling of movement in the body, is felt just before the seizure. While major seizures can come on suddenly, they rarely last longer than 3 minutes. After it is over, the person who seized might not remember what happened. They may feel sleepy, exhausted, or confused.

### Signs and Symptoms of a Seizure

- A sudden cry and stiffening of the body and loss of consciousness causing the person to fall
- Noisy breathing and frothy saliva
- Body jerking
- Breathing may stop or be irregular for a minute and the casualty might turn blue
- Loss of bladder and bowel control

### First Aid for a Seizure or Convulsion

- Begin ESM by ensuring that the scene is safe. Make the area safe by clearing away dangerous objects that are sharp. Move all objects away from the convulsing person, sharp or not, anything they can hit their head on. Clear bystanders away to protect the casualty's privacy. Put soft objects (like a pillow) near heavy or sharp objects that you cannot move (like a wall or pillar). Do not put anything in their mouth. Put a pillow under their head.
- Wear appropriate protective equipment.
- Ensure the airway remains open during and after the seizure has ended.
- For convulsions:
  - Don't restrict the casualty's movements
  - Loosen tight clothing, especially around the neck
  - Place something soft under the head
  - DO NOT place anything in the mouth, between the teeth, or hold the tongue
- After convulsions:
  - Assess responsiveness and do a primary survey. Place the unconscious casualty into the recovery position.
  - Do a secondary survey to see if the casualty was injured during the convulsions.
  - Give ongoing care. Monitor breathing. Keep the casualty warm.
  - Avoid giving the casualty any liquids after a seizure.
  - Treat for Shock.

### Contact EMS If

- There is ongoing or multiple seizures that last for more than 10 minutes
- There are no history of seizures
- The cause of the seizure is unknown
- Injury has occurred due to a fall or during the seizure that warrants medical attention

## Fever Emergencies for Infants and Children

A quick rise in temperature from the normal **37 °C(98.6 °F)** to 38 °C (100.4 °F) or higher can cause convulsions in infants and children. Assess the severity of a fever by taking the child's or infant's temperature at the armpit. A fever emergency occurs if a child or infant has a temperature of 38 °C or higher.



## First Aid for Fever Emergency

- Begin ESM by ensuring that the scene is safe
- Complete the primary survey.
- Wear appropriate protective equipment.
- Advise the parent or caregiver to call a doctor immediately for advice. Follow instructions given by the doctor and this should reduce the temperature of the child.
- If fully conscious, encourage the child to drink fluids.
- Dry and dress the child in comfortable clothing. Monitor the child's temperature and repeat previous 3 steps.
- Treat for shock.
- If the child convulses
  - Do not restrain the child. Protect them from injury by removing dangerous objects and gently guiding movements.
  - Loosen constricting clothing
  - When convulsions cease, place into recovery position. Seek medical attention.

## Asthma

Asthma is an illness characterized by attacks of shortness of breath. These attacks often include wheezing and coughing. Asthma in children may go away upon entrance into adulthood.

There are a variety of stimuli which trigger asthmatic attacks. Here are a few:

- Pollen
- Respiratory infections
- Exercise
- Smoke/pollution
- Pet hair
- Insect stings or bites
- Particular foods

An asthmatic attack is graded from mild to severe based on the degree of airway restriction.

## Signs and Symptoms of a Severe Asthmatic Attack

- Shortness of breath
- Wheezing or coughing
- Fast, shallow breathing
- Fast pulse
- Shock
- Bluish colour to the face
- Casualty sits upright leaning forward attempting to breathe
- Restlessness
- Fatigue from attempting to breathe



Figure 21: During an asthma attack the rescuer may assist the casualty in taking his / her prescribed medication.

## First Aid for an Asthma Attack

- Begin ESM by ensuring that the scene is safe.
- Wear appropriate protective equipment.
- Conduct a primary survey.
- Have the casualty stop any activity. Place them in a comfortable position (upright with arms resting on a table or on their knees is recommended).
- Assist (but do not administer) the casualty to take their prescribed medication.
- If no medication, not responding to medication or having difficulty breathing call EMS for help. If the casualty states that he/she is having an asthma attack and has medications or an inhaler and the casualty identifies the medication and is unable to administer it without assistance, the first aider may assist the casualty in using his / her prescribed bronchodilator medication.
- Refer to OHS position statement FA014 Medication in First Aid Kits
- Treat for shock.
- Give ongoing care until the person feels better with no breathing problems or until medical help can take control. Be calm and reassuring to reduce stress or anxiety.

## Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive pulmonary disease is a lung disease which is similar to asthma but is not fully reversible. Casualties will have on-going shortness of breath and some may have supplemental oxygen. Asthma treatment will not help these casualties.

## Anaphylaxis (Severe Allergic Reaction)

*Anaphylaxis* is a severe allergic reaction occurring when a triggering substance enters the body involving one or more of the body's systems. It can be life-threatening. Anaphylaxis can happen in very rare circumstances without any contact to a particular substance and even just by exercise.

### Signs and Symptoms of Anaphylaxis

#### *Early signs*

- Sneezing
- Itching, flushed skin, hives
- Nausea/vomiting/abdominal pain
- Coughing
- Swelling of the lips and tongue
- A lump or tickle in one's throat
- A numb tongue or numbness where the allergen has made contact.

#### *Delayed signs*

- Anxiety
- Pale skin
- Shock, wrist pulse difficult to find
- Breathing difficulty with high pitched squeaky noise when inhaling.
- Tightness in chest
- Unconsciousness, stopped breathing, cardiac arrest



Figure 22: Common medication for allergic reactions is an EpiPen

## First Aid for a Severe Allergic Reaction

- Begin ESM by ensuring that the scene is safe.
- Wear appropriate protective equipment.
- Conduct a primary survey and have a bystander call EMS/911. Identify the issue as a severe allergic reaction.
- Have the casualty cease all activity. Place them in a comfortable breathing position (sitting upright with arms resting on a table or knees is recommended).
- First Aiders may assist with medication in cases where an individual is unable to take his or her own medication without assistance\*. This medication does not include over the counter medications, only prescription medications of a life-saving nature.
- Conduct a secondary survey.
- Treat for shock.
- Provide ongoing care. Stay with casualty until medical help takes control. Calm and reassure them to prevent anxiety and stress.

\*For Alberta, please refer to the document titled "Medication in first aid kits" given at the start of the course.

### Environmental Emergencies

There are a variety of environmental conditions which can cause many emergencies. These conditions are typically associated with overexposure to hot and cold temperatures which could cause harm to a person and lead to medical emergencies.

#### Cold-Related Emergencies

##### Frostbite (frost nip)

Frost nip is a superficial skin injury due to skin freezing. Frostbite is characterized by the freezing of the skin at a deeper level underneath the surface. Fingers, toes, cheeks, nose and ears are susceptible to either condition. Frostbite is often associated with *hypothermia*.

##### Causes

Exposure to cold temperatures.

##### Prevention

- Avoid exposing any part of the body to cold or frozen objects.
- Wear appropriate clothing (especially children). Wear a hat and layers made of tightly woven fibers (e.g., wool). Avoid cotton as it holds water and doesn't dry well.
- Cover vulnerable areas fully (e.g., toes, ears, fingers, and nose)
- Take frequent breaks from the cold to allow bodies to warm up from the cold
- Stay hydrated but do not drink excessive alcohol or caffeine products.
- Checking weather before going out

##### Signs and Symptoms of Frost Nip

- Pain or stinging in the affected area
- Numbness in the affected area
- Skin that looks paler than it should

## Signs and Symptoms of Frost Bite

- Skin is pale, grey waxy, flushed, yellow, or blue (can appear in patches)
- Skin is hard or solid as well as cold to the touch
- Burning sensation after thawing followed by redness, pain, and/or tenderness
- Numbness in the affected area
- Blisters can form after thawing
- Severe pain upon rewarming, or, if nerves are damaged, no feeling in the area, even after rewarming.

## First Aid for Frost Bite

- Begin ESM by ensuring that the scene is safe
- Complete a primary survey.
- Wear appropriate protective equipment.
- Call 911 and get an AED if the frostbite is associated with severe hypothermia.
- Remove the casualty from the cold environment
- Use warm water or body heat to gently warm the affected area.
- Do NOT break any blisters that may form. Protect them with loose and dry dressings. Place gauze between fingers and toes if they are affected.
- If the affected area has a chance of freezing again don't thaw the area. If they are already thawed, wrap them so they don't refreeze.
- Do not walk on frostbitten feet or toes if possible.
- DO NOT rub the area.
- Treat for shock.
- Where 911 has been called, conduct a secondary survey and provide ongoing care until medical support arrives

## Trench Foot

Trench foot is a condition that develops when feet are cold and wet for a long time and affects the skin. It is also known as immersion foot syndrome and is a non-freezing cold injury.

### Signs and Symptoms for Trench Foot

- pain
- tingling or itching
- swelling
- cold and blotchy skin
- numbness
- a prickly or heavy feeling

### First Aid for Trench Foot

- Begin ESM by ensuring that the scene is safe
- Complete a primary survey.
- Wear appropriate protective equipment
- Prevent further hypothermia to the casualty
- Remove casualty from the cold minimizing walking on the affected feet (removing wet socks if only after patient is in a warm environment)
- Warm feet up slowly without rubbing (quickly warming the foot can make damage worse)
- Keep feet dry and change socks as needed
- Allow feet to air dry at room temperature
- Do not sleep/rest with socks on (let the feet breathe)
- Wash feet regularly and allow to fully dry before putting on socks.

In serious cases the person can take ibuprofen to help reduce swelling and should elevate the feet.

## Hypothermia

Hypothermia is life-threatening. It occurs when a person's body hits too low of a temperature for too long. It can take three forms:

Mild – shivering, numbness, body temperature slightly below normal

Moderate – shivering, numbness, lack of coordination and/or speech, confused behavior, impaired judgement

Severe – shivering has stopped, complaining of being cold has stopped, numbness, lack of coordination/speech, confused behavior, impaired judgement, body below 30C (86F), breathing may have slowed or stopped, possible unconsciousness, body may feel stiff

	Responsiveness	Physical	Alertness	Skin
<b>Mild Hypothermia</b>	Responsive	Shivering	Alert	Normal to Blushed
<b>Moderate Hypothermia</b>	Responsive	Shivering & Impaired Movement	Alert but Diminishing	Pale & Cold
<b>Severe Hypothermia</b>	Unresponsive	Not Shivering & Little to No Movement	Not Alert	Likely Pale & Cyanotic Cold

Please note that signs and symptoms in red warrant immediate medical aid.

Levels of Hypothermia	Core Body Temperature	Persons Ability to Rewarm Naturally	Clinical Presentation of Hypothermic Patient	
<b>Normal</b>	Above 95°F 35°C	N/A	Cold sensation shivering	
<b>Mild</b>	95-90°F 35-32°C	Good	Physical impairment • Fine motor • Gross motor	Mental impairment • Complex • Simple
<b>Moderate</b>	90-82°F 32-28°C	Limited	<b>Below 90°F (32°C) shivering stops</b> <b>Below 86°F (30°C) consciousness is lost</b>	
<b>Severe</b>	Below 82°F 28°C	Unable	Rigidity  Vital signs reduced or absent  Severe risk of mechanically stimulated	



			Possibility of cardiac arrest with rough handling
	Below 77°F 25°C	Unable	<b>Cardiac Arrest</b>

### First Aid for Hypothermia

- Begin ESM by ensuring that the scene is safe
- Complete a primary survey.
- Wear appropriate protective equipment.
- Retrieve an AED and call EMS.
- Monitor breathing carefully.
- Remove casualty away from the cold and into shelter if possible.
- Remove any wet clothing and dry the casualty.
- Warm the casualty by wrapping blankets around them and/or putting on dry clothing. Cover the head and neck.
- Wrap all exposed body surfaces with anything at hand (blankets, clothing, newspapers). Warm the casualty gradually and handle very gently. Call EMS for casualties experiencing symptoms greater than mild hypothermia.
- If casualty is alert, give them warm liquids to drink (alcohol, caffeine or chocolate should be avoided).
- Treat for shock.
- Provide continual care until medical professionals take over.

### Snow Blindness

The eyes can be damaged from looking at snow too long on a bright, sunny day. Snow blindness can occur due to the reflection of the sun's ultraviolet rays. Children are more at risk because a child's eyes do not block these rays as well as an adults.

#### Prevention

- Wear goggles when doing activities outside or sunglasses with good protection (even sides, tops and bottoms). Sun glasses should be rated for protection against UV rays.

#### Symptoms of Snow Blindness

- Burning sensation
- Redness
- Pain or itchiness in the eyes
- Swelling
- Feeling of sand in the eyes.

#### First Aid for Snow Blindness

- Begin ESM by ensuring that the scene is safe
- Complete a primary survey
- Wear appropriate protective equipment
- Place the person in a darker environment or apply appropriate eye protection
- Use cool, damp clothes to reduce pain and burning
- Treat for shock
- Seek medical attention

## Heat-Related Emergencies

When the body's temperature gets too high, *heat cramps*, *heat exhaustion*, and *heat stroke* can occur. All are classified as heat-related emergencies.

A heat-related emergency can be caused from four main sources:

- Physical
  - Age: babies and children are less able to sweat and adjust to temperature swings
  - Chronic illness
  - Burns
  - Skin, hormone, or nervous system diseases
- Environmental
  - Heat waves
  - High humidity
- Behavioural
  - Not drinking enough fluids
  - Drinking or eating items that dehydrate you (alcohol, illicit substances esp. stimulants, caffeine, salty foods)
  - Exercising too much in hot weather

- Spending too much time in the heat or sun
- Other
  - Obesity
  - Salt depletion or water depletion
  - Poor physical fitness

### **Prevention:**

- Stay in shaded areas when very hot.
- Avoid staying outside during the hottest part of the day (typically early afternoon).
- Stay hydrated (avoid alcohol and caffeine drinks).
- Wear appropriate clothing for the weather (hats, light colored clothing etc)
- Check the weather before going out

## **Heat Cramps**

### **Signs and Symptoms of Heat Cramps**

- Mild contractions that can become severe, usually in abdomen and the legs
- Body temperature is usually normal
- Moist skin

### **First Aid for Heat Cramps**

- Begin ESM by ensuring that the scene is safe
- Complete a primary survey.
- Wear appropriate protective equipment.
- Retrieve cool water for the casualty.
- Have the casualty rest in a cool place
- Give the casualty fluids to drink, preferably sport drinks or juices
- Stretch and massage cramped muscles
- Treat for shock.
- Provide continual care until medical support can take over

## Heat Exhaustion

### Signs and Symptoms of Heat Exhaustion

- Normal or slightly raised body temperature (higher than 37C or 98.6F – 40C or 104 F)
- Moist skin, excessive sweating.
- Skin is redder or paler than normal
- Nausea/vomiting
- Dizziness or weakness
- Exhaustion

### First Aid for Heat Exhaustion

- Begin ESM by ensuring that the scene is safe
- Complete a primary survey.
- Wear appropriate protective equipment.
- Call medical services and get an AED if the casualty is vomiting or is losing consciousness
- Have the casualty rest in a cool place
- Loosen any tight clothing. Remove any clothing that is soaked with sweat.
- Put cool water on the skin and fan the casualty to increase evaporation.
- Do not allow the casualty to participate in more activities on that day. If the condition worsens, follow the care for heat stroke.
- If cool water bottles are available then place on areas of large blood vessels (under arm pits, back of neck, under knees or groin area). Use a barrier device in order to prevent burning.
- Treat for shock.
- Have the person sip cool water.

## Heat Stroke

### Signs and Symptoms of Heat Stroke

- High body temperature (as high as 40 C or 104F)
- Red, hot, dry skin
- Irritable, bizarre, or aggressive behavior
- Progressive loss of consciousness

- Rapid, shallow breathing
- Seizures
- Rapid, weak pulse becoming irregular
- Vomiting

### **First Aid for Heat Stroke**

- Begin ESM by ensuring that the scene is safe
- Complete a primary survey.
- Wear appropriate protective equipment.
- Have someone call 911 and get an AED. If you are alone, call EMS, get an AED, then return to the casualty.
- Have the casualty rest in a cool place
- If possible, immersion of the casualty's body up to the chin in cool water is the initial recommended treatment. Otherwise apply cool, wet towels or sheets or cold packs to the body core, around the head and in the arm pits.
- Treat for shock.
- Provide continual care until medical support can take over.

**Be aware that heat-related emergencies can worsen from one stage to another very quickly**

# Chapter 16

## Burns

Burns occur when radiation, chemicals, electricity or heat cause an injury to the skin. Burns are a leading cause of injury in the home. Many burns can be prevented.

### Prevention:

- Know what chemicals you are working with
- Avoid spending too much time when the sun is at its hottest (10am-4pm)
- Dress appropriately for your activity
- Put electric plug covers on electric sockets if you have children or infants in your home
- Know what the outdoor temperature and UV rating is before going out
- Stay alert when working around heat sources and chemicals
- Leave chemicals in original containers with labels intact.
- Keep hot liquids out of reach of small children.
- Teach children what different symbols mean and keep all chemicals away from their reach (place in lockable cabinets)
- Plug items appropriately and safely. Do not overload a socket.
- Stay indoors or in a vehicle if there is a lightning storm. Unplug all appliances. Stay away from all metal objects. Do not ride any metal vehicles (motorcycles, bicycles, farm equipment etc) during a lightning storm.

## Recognizing Burns

### First-Degree Burn (Superficial)

First degree burns cause minimal skin damage and are also referred to as superficial burns. They affect the outermost layer of the skin.

### Signs and symptoms of a first degree burn are characterized by:

- Red or pink skin
- Tingling

- Visual skin damage
- Slight swelling
- Skin is hot to touch
- Experience of tenderness or severe pain to the injured area

## Second-Degree Burn (Partial Thickness)

Second degree burns are more serious than first degree burns because the damage goes beyond the top layer of skin.

**Signs and symptoms of a second degree burn are characterized by:**

- Raw looking and red skin.
- Skin is moist and ranges in colour from white to cherry red
- Blisters with clear fluid
- Extreme pain

## Third-Degree Pain (Full Thickness)

Third degree burns are more severe than second degree burns.

**Signs and symptoms of a third degree burn are characterized by:**

- White, tan-coloured or charred black skin that has a waxy look to it.
- Dry and leathery skin.
- Dark brown color
- You might see bones and blood vessels under the skin
- Little or no pain (the nerves have been destroyed).

## Types of Burns

### Heat Burns (also known as Thermal)

These burns result from too much heat applied to the body. They are the most common type of burns. Flames, candles, or hot objects like a stove or car engine are common sources for this injury. A scald is a heat burn caused by steam or hot liquid. Heat burns can also result from friction.

## Chemical Burns

Chemical burns are serious because the chemicals will not stop burning the casualty as long as they remain on the skin. Acids, alkalies, phenols, and phosphorous are examples of industrial chemicals that burn. Paint stripper, drain cleaner, and rust removers are common burning chemicals in the home. First aiders should be aware when a person is exposed to some chemicals there can potentially be a delayed reaction to the chemical they were exposed to.

## Electrical Burns

Electrical burns result from contact with an electric current. While they are technically heat burns, the addition of electricity may present additional complications and must be considered separately.

## Radiation Burns

Sunburn is a type of radiation burn which is commonly experienced by many people. X-rays, welder's flash, and radiation from radioactive material are also sources for radiation burns.

### Severity of a Burn

A burn can also be classified on a scale of severity that ranges from *mild*, *moderate*, or *critical* (Severe). Being able to identify severity will help you prioritize care when there are multiple casualties on scene. Severity is determined by:

- The depth of the burn
- The amount of body surface burned
- The part of the body that is burned
- The age and physical condition of the casualty

Anytime there is more than 10% of burns on the body then call EMS/911. If the burn is affecting mobility or breathing then call EMS/911. In order to calculate if a burn is greater than 10% measure the extent of the burn using your palm. A person's palm (not including the fingers) is 1% of their body.



## Critical Burns

Critical burns are life threatening. They may also cause life-long disability or disfigurement. A critical burn is indicated by:

- Any burn that interferes with breathing (smoke inhalation, burns to face, nose)
- Any burn where there is a serious soft tissue injury or fracture
- All burns to areas where the skin bends (e.g., elbow)
- All electrical burns
- Most chemical burns
- Burns to casualties under 2 or over 50 years of age

## Burn Complications

There can be several complications associated with burns. In critical burns, all the major systems of the body may be affected. As a result, burn casualties need medical help immediately. Below are some common complications:

- Shock – often caused by loss of blood to the surrounding tissues. Shock can also be caused by blast injuries, or blunt trauma following an explosion.
- Infection – burned skin isn't a viable barrier to bacteria and the burned area can be a place for bacteria to breed
- Breathing problems – if the face or throat is burned, breathing might be hampered. The casualty might also have inhaled smoke, fumes, or steam.
- Swelling – clothes or jewelry may cut off circulation as the affected area swells

## First Aid for Burns

### First Aid for Heat Burns (Thermal)

- Begin ESM by ensuring that the scene is safe
- Complete a primary survey.
- Wear appropriate protective equipment.
- Call EMS if breathing is affected, more than 10% of the body is burned, mobility is a concern or if you are unsure.

- Cool the burn right away – immerse it in cool water or pour cool water on the area and cover it with a non-stick gauze (do not use cotton). Keep cooling the burn until the pain lessens.
- Loosen or remove anything on the burned area that is tight (e.g., clothing, jewelry). Do this promptly before swelling occurs. Don't remove anything that is stuck to the casualty (clothing or jewelry).
- After the pain has lessened, loosely cover the burn with a clean, lint-free non-stick dressing. Secure the dressing but do NOT put tape on the burned area (do not use cotton).
- Give ongoing casualty care until medical help takes over.
- Treat for shock.

### **First Aid for Chemical Burns**

- Begin ESM by ensuring that the scene is safe
- Complete a primary survey.
- Wear appropriate protective equipment.
- Call EMS if breathing is affected, more than 10% of the body is burned, mobility is a concern or if you are unsure.
- Remove the chemical from the body by flushing the area with a large amount of cool water (if directed to do so by SDS sheets). If the chemical is a dry power, quickly brush off any loose chemicals with a cloth before flushing (if directed to do so by SDS sheets).
  - Don't delay flushing for clothing removal
  - When brushing chemicals off skin wear proper protective equipment (gloves)
  - Avoid contaminating yourself
  - Remove clothing *while* flushing the area
- Continue to flush the area for no less than 15-20 minutes.
- Loosely cover the burn with a clean, non-stick, lint-free, and sterile dressing. Secure the dressing with tape and be sure not tape is touching a burned area.
- Give ongoing casualty care. Monitor for shock until medical help takes over.
- Treat for shock.
- Bring chemical with you to medical care (even if the substance is not known). As well send copy of SDS with the casualty.
- If at work complete all required first aid records

## First Aid for Electrical Burns

- Begin ESM by ensuring that the scene is safe. Make sure there is no further danger from electricity. If you are unsure, don't put yourself in danger. Only turn off electricity at the source. Do not cut or move live wire. If very high voltages are involved, your role is to prevent others from going into the dangerous area until the power is shut off. Have a bystander call EMS/911.
- Complete a primary survey.
- If casualty is not breathing normally begin CPR
- Wear appropriate protective equipment.
- Call EMS if breathing is affected, more than 10% of the body is burned, mobility is a concern or if you are unsure.
- Assume head and spine injuries.
- Do a secondary survey to locate burns, dislocations etc. Look for both entry and exit burns.
- Give first aid for the entry and exit burns by covering them with clean, dry, non-stick dressings. Tape these in place, making sure the tape doesn't touch damaged skin. Monitor ABC's very carefully as the electricity may have affected it.
- Give first aid for any fractures or dislocations.
- Treat for shock.
- Give ongoing care.

## First Aid for Radiation Burns

Radiant energy causes radiation burns. Sunburns are burns caused by sunlight (a radiant source). Sunlamps at tanning salons can also cause similar burns to the skin or eyes. X-rays and welding flashes are examples of other radiant sources.

### First Aid for Sun Burn

For *minor* burns:

- Begin ESM by ensuring that the scene is safe.
- Complete a primary survey.
- Wear appropriate protective equipment.
- Get the casualty out of the sun. Gently sponge the area with cool water or cover with a wet towel, to relieve pain.

- Pat the skin dry and put on a medicated ointment. Apply the ointment based on the product's directions as directed by the casualty's doctor.
- Protect burned areas from further sun exposure.
- Don't break any blisters as this may promote infection. If large areas are blistering, get medical help.
- Treat for shock.
- If the casualty begins to vomit or becomes feverish, give first aid for heatstroke.

## Stop, Drop, & Roll

If your clothes have caught on fire, follow the “stop, drop, and roll” procedure:

- STOP – stop moving
- DROP – get to the ground
- ROLL – roll several times to put flames out

## Exiting a Smoke-Filled Room

If you are in a room that is filled with smoke, cover your mouth and nose with a wet cloth. Next, keep your head low and crawl under the smoke. Hot smoke will rise and the low areas can offer respite.

# Chapter 17

## Systems of the Body

### Respiratory System

The respiratory system is a sequence of organs which allow you to breathe. It consists of three main parts which are the airway, lungs and diaphragm. The room air (fresh air) we breathe in contains about 21% oxygen which is used by the lungs by removing the oxygen and passing it through our bloodstream. In the bloodstream it is carried off to organs and tissues that allow us to move, walk and talk. When we breathe out our lungs take carbon dioxide from our blood and release it into the air.

### Cardiovascular System

The cardiovascular system's major function is to transport oxygen, nutrients and hormones to cells and tissues throughout the body as well as remove metabolic waste from the tissues and cells. It consists of three major parts which are the heart, blood vessels and the blood.

### Musculoskeletal System

The musculoskeletal system major function is to protect the body's vital organs and to support the body while still allowing for motion. The three main parts are muscles, joints and other connective tissues.

### Nervous System

The nervous system is divided into two parts; the central and peripheral nervous system and its primary function is to carry messages throughout the body. These systems are made up of three major parts; brain, spinal cord and nerves. The central nervous systems consists of the brain and the spine. The peripheral nervous system consists of nerves that reach all areas of the body. This system keeps order internally to the body by sending messages which coordinate the actives from organs or muscles. All signals are sent between nerves and cells which trigger actions to protect our body from danger.

# Chapter 18

## Additional Content for Healthcare Providers

### Breathing Emergencies

Either injury or illness can impact a person's capacity to breathe. This impact poses an immediate threat and can put a person's life in danger. Recognizing a breathing emergency is a vital skill for first aiders.

### Hypoxia

Hypoxia is a result of a lack of oxygen in the blood. Poor blood oxygen levels can damage tissues and lead to death if not addressed. There are several underlying reasons for hypoxia:

#### *Lack of oxygen*

- The oxygen is displaced by other gases
- An environment can have oxygen levels that are low (e.g., high altitude)
- The oxygen in a small space is consumed

#### *Blocked airway*

- The casualty's airway is swollen (e.g., infection or allergic reaction)
- The casualty chokes on a foreign object
- The casualty is face up while unconscious and the tongue blocks the airway

#### *Ineffective breathing*

- Inhalation injury (e.g., due to smoke)
- Drug overdose
- Spinal cord injury
- Severe chest injury

### Abnormal heart function

- An injury to the head, spine, chest or other area
- A drug overdose
- Poisoning
- An illness

## Signs of Normal Breathing

Breathing rate, rhythm, and depth are the indicators for normal breathing. *Breathing rate* is the number of breaths per minute. *Breathing rhythm* is the interval between breaths. *Breathing depth* is the amount of air moved in and out of the lungs during each breath.

Normal breathing can also be represented by:

- Quiet and effortless breathing
- Normal skin colour
- Chest movement is equal on both sides
- Person is alert
- Person is able to speak freely without taking too many breaths

Breathing Rates (Breath per Minute)			
	Normal range	Slow	Fast
Adult	12-20	Under 10	Over 30
Child	20-30	Under 15	Over 40
Infant	30-50	Under 25	Over 60

## Indicators of Ineffective Breathing

Breathing is considered effective when breathing is normal. When a person's body becomes impaired, breathing is classified as ineffective. Ineffective breathing can take a variety of forms and

be caused by a variety of factors. When breathing is severely affected, the casualty is determined to have severe *breathing difficulties*.

### Signs and symptoms of severe breathing difficulties

- Casualty struggles (gasps) for air
- Casualty may be sweaty
- Person is anxious, even terrified
- Decreased level of consciousness
- Person indicates they are "getting tired"
- Unable to feel air moving in and out of nose
- Breathing rhythm is irregular
- Little to no chest movement
- Breathing rate is too slow or too fast
- Chest movement is abnormal
- Breathing depth is too shallow or too deep
- Lips, ears, fingernail beds appear bluish

### First Aid for Apnea

Artificial respiration (AR) is a method for supplying air to the lungs when a casualty is not breathing (called apnea). It is a way to ensure oxygen continues to supply the brain, heart, and other organs. During a primary survey, you check the casualty for their breathing. It is at this point where AR is applied if you have the training to deliver it.

### Techniques for Artificial Respiration (Rescue Breathing)

- **Mouth-to-Mouth AR** – the most common technique. This entails pinching the nose closed and blowing into the casualty's mouth.
- **Mouth-to-Nose AR** – When mouth-to-mouth is not available or inappropriate you can hold the casualty's mouth closed and breathe through their nose.
- **Mouth-to-mouth-and-nose AR** – used for infants and small children where your mouth is able to fit over both the mouth and nose
- **Mouth-to-stoma AR** – for casualties who have had a tracheostomy, the AR is delivered through a hole in their neck (the stoma)



## How to Give Artificial Respiration

There are a variety of methods and circumstances for delivering AR. In each instance, the sequences described follow the same steps as the emergency scene survey and the primary survey described in earlier chapters.

### **Mouth-to-Mouth AR (Adult casualty)**

1. Begin ESM – commence with the scene survey.
2. Wear appropriate personal safety equipment.
3. Assess responsiveness.
4. Send for medical help and attempt to acquire an AED.
5. Place casualty face up, protecting the head and neck during any movement. Open the airway by tilting the head (use jaw-thrust if spinal is suspected).
6. Check for normal breathing for up to 10 seconds. If there is no breathing, go to Step 7.
7. Breathe into the casualty twice. For an adult casualty blow for 1 second. Use enough air to make the chest rise.
8. Check for a pulse at the neck for 10 seconds. Do not feel for a pulse on both sides at the same time.
9. Breathe into the casualty once every 5-6 seconds (10-12 times per minute). After two minutes of AR, recheck for a pulse for 10 seconds, and at the same time look, listen, and feel for breathing.
10. No pulse? Start CPR and apply AED
11. If there is a pulse, but still no breathing, continue AR. Recheck for a pulse every 2 minutes. Keep giving AR until the casualty starts to breathe or until medical help takes control (or you are too fatigued to carry on).

### **Mouth-to-Mouth AR (Child casualty)**

1. Begin ESM – complete a scene survey. Ask a parent or guardian for consent to help if they are around.
2. Assess responsiveness.
3. Wear appropriate personal safety equipment.
4. Send a bystander for medical help and get an AED. If alone, perform 2 minutes of AR before activating EMS. Carry the child with you if possible after performing AR.

5. Place the casualty face up. Open the airway by tilting the head (use jaw-thrust if spinal is suspected).
6. Check for breathing for up to 10 seconds. If there is no breathing, go to Step 7.
7. Breathe into the casualty twice. Blow for 1 second. Use enough air to make the chest rise.
8. Check for a pulse at the neck. Do not feel for a pulse on both sides at the same time.
9. Breathe into the casualty once every 3-5 seconds (12-20 times per minute). After two minutes of AR, recheck for a pulse for 10 seconds, and at the same time *look, listen, and feel* for breathing.
10. No pulse? Start CPR and apply AED
11. If there is a pulse, but still no breathing, continue AR. Recheck for a pulse every 2 minutes. Keep giving AR until the casualty starts to breathe or until medical help takes control (or you are too fatigued to carry on).

### **Mouth-to-Mouth AR (Infant casualty)**

1. Begin ESM – complete a scene survey. Ask a parent or guardian for consent to help if they are around.
2. Assess responsiveness.
3. Wear appropriate personal safety equipment.
4. Send a bystander for medical help and get an AED. If alone, perform 2 minutes of AR before activating EMS. Carry the infant with you if possible after performing AR.
5. Place the baby face up. Open the airway by tilting the head (use jaw-thrust if spinal is suspected).
6. Check for breathing for up to 10 seconds. If there is no breathing, go to Step 7.
7. Breathe into the casualty twice. Blow / “puff” for 1 second. Use just enough air to make the baby's chest rise.
8. Check for the brachial pulse. Remember that pulses can be hard to find. If there is no pulse or you are unsure, start CPR immediately
9. Breathe into the casualty once every 3-5 seconds (12-20 times per minute). After two minutes of AR, recheck for a pulse for 10 seconds, and at the same time *look, listen, and feel*.
10. No pulse? Start CPR
11. If there is a pulse but still no breathing continue AR. Recheck for a pulse every 2 minutes. Keep giving AR until the casualty starts to breathe or until medical help takes control (or you are too fatigued to carry on).

# Appendix A

## Sample First Aid Kit

Below is a checklist for items to be included in a home kit.

- Emergency phone numbers
  - EMS
  - Poison Control Center
  - Personal doctors
  - Home and workplace numbers of family members, friends, and neighbours
- Adhesive tape
- Sterile gauze pads
  - Small squares
  - Large squares
  - Non-stick gauze
- Roller and triangular bandages to hold dressing in place or for making a sling
- Tweezers
- Scissors
- Band-aids
- Safety pins
- Ice bag
- Flashlight with batteries in a separate bag
- Radio with batteries in a separate bag
- Personal protective equipment including
  - Gloves (latex free) and mask
  - Antiseptic wipes, soap, and hand sanitizer
- Pencil and writing pad
- Emergency blanket
- Thermometer for taking temperature
- Eye patches