

MOUNTAINEERING KNOWLEDGE & SKILLS

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Wilderness First Aid

This module is meant to prepare you for the most common medical emergencies which may arise in the wilderness and how to treat it, keeping in mind that you would have only basic medical equipment and might not be close to any kind of civilisation.

It is the leader of a group's responsibility to ensure an adequate medical kit is taken with on each trip and to have the knowledge to apply medical care in an emergency. The four main stages in dealing with an emergency are:

1. Prevention – This includes taking measures to prevent the group from being confronted by hazards, making sure each group member is adequately equipped for unforeseen circumstances (like bad weather) and also preventing an existing emergency to turn worse.
2. Assessment – This includes assessing the emergency scene (what caused the emergency and is anyone else at risk), starting your primary assessment of the patient, and deciding whether or not professional help should be summoned.
3. Treatment – Finding the cause of the emergency and treat it along with the result of the emergency
4. Evacuation – Getting the patient to professional help can mean starting to evacuate the patient yourself or waiting for back-up to arrive first.

Primary Treatment

The primary assessment and treatment of a person in need is the first priority in all emergency situations. This is meant to make sure that no further hazards threaten the patient, or yourself, or any bystanders, and to take care of any critical treatment your patient may need, before advancing to less critical treatment.

The first important rule to remember when coming across an emergency is to STOP, THINK THEN ACT. This means that before jumping to action, you need to collect yourself by stopping and first take a deep breath and think of how you should approach the rescue. A calm, rational thinking rescuer is far more likely to succeed than a disturbed, nervous rescuer, because first aid treatment is generally very logical and having plain common sense definitely helps. Not only is it important for the rescuer to calm himself, he needs to calm and reassure the patient (if he/she is conscious) and any bystanders as well.

After calming yourself, you need to assess the scene. You should ask yourself the following questions:

What caused the emergency? (What was the mechanism of injury?)

Is the cause of the emergency still a threat?

Is it safe to approach the patient and if so, is it safe to treat the patient where he is, or do I need to move him?

Can I move the patient or do I suspect spinal injury?

Am I going to have to evacuate the patient, and should I wait for back-up?

After checking the area for any possible hazards for you (the use of personal barriers, like gloves, is part of making the scene safe for you), the patient and bystanders, and regarding the scene to be safe, you can approach the patient and check the patient's level of consciousness. This is done using the AVPU-scale:

A – Alert

V – Verbal response

P – Pain response

U – Unresponsive

If the patient is awake and aware of everything, he scores an A on the AVPU-scale. This patient has an open airway, is breathing and has a beating heart. Further evaluation is needed to find out what is wrong (luckily the patient should be able to help you in this regard by mentioning symptoms), before you can decide if immediate evacuation is needed or not.

If the patient is not alert, but responds to your voice, he/she scores a *V*. If the patient doesn't respond to your voice, but responds to painful stimuli (for example a pinch) he scores a *P*. However, if he/she remains unresponsive, the patient scores an *U*.

V, P and U indicates a *decreased level of consciousness* and the patient needs professional medical attention and a call for help should immediately be sent out.

If the patient is unconscious, and after you have sent someone to go call for help, you can start the process of finding out if the patient is breathing and circulating blood. If not, you have to start cardiopulmonary resuscitation (*CPR*). Here follows a brief outline of the *CPR* process:

1. Open Airway – This can be done by looking into the patient's mouth and doing a finger sweep with a gloved finger to remove any visible obstructions. Then position the head to ensure the airway is open by using the *head-tilt-chin-lift manoeuvre* or the *jaw-thrust manoeuvre* (if spinal injury is suspected).
2. Check Breathing – Next you need to find out if the patient is breathing. This is called *Look, Listen and Feel*. If the patient is breathing you can accept that his heart is beating and you can continue to the next treatment. If he/she is not breathing, you have to continue *CPR* by giving 2 *rescue breaths*.
3. Check Circulation – This is done by checking for the *carotid pulse*. If a pulse is felt there is blood circulation so you can go back to step 2. If the patient has no pulse you need to start assisting in the circulation of blood. Give another 2 *rescue breaths*, then give 15 *chest compressions*. Continue to assist in respiration by giving 2 *rescue breaths*, and then circulate with 15 *chest compressions*. Continue this process for 4 cycles or roughly 1 minute and then go back to step 1.

Note: different institutions prescribe different rescue breath to chest compression ratios.

SEVERE BLEEDING

If you are satisfied that the patient is breathing and circulating adequately on his own, you can continue to the next stage of primary treatment; managing severe bleeding. Visible haemorrhage (external bleeding) can be classified in three categories:

- *Arterial bleeding* – bright red (oxygenated) blood, spurting in rhythm with the pulse
- *Venous bleeding* – dark red (deoxygenated) blood, flowing steadily
- *Capillary bleeding* – normally dark red blood and oozing slowly

Severe blood loss can compromise circulation in the body; therefore managing severe bleeding can be seen as part of *CPR*. For example, if you are busy performing *CPR* on a patient and you notice the patient is bleeding severely somewhere on his body, you need to incorporate the management of the wound into your *CPR* process. This can be come tricky especially in circumstances where you have nobody to help you.

TREATMENT OF EXTERNAL BLEEDING:

- Calm and reassure
- Apply direct pressure to the wound, by bandaging it up. If the bleeding is on an extremity, it is important to check for a distal pulse and sensory and motor response before and after applying the bandage, to make sure you are not cutting off circulation or nerves with a bandage that are too tight. If blood starts seeping through the bandage, you can apply more bandages, but don't take off any bandages after you have put it on.
- Elevate the wound above the level of the heart. This will decrease blood flow to the wound.
- Apply ice to the general area of the wound. The cold ice will cause the blood vessels to constrict and thus decreasing the blood flow.
- Apply indirect pressure at a pressure point, if possible.

Note: The use of a tourniquet is potentially very dangerous and can create more problems rather than solve them. A tourniquet should only be considered as a means of bleeding control in extreme cases where an amputation has already been done or in an absolute last resort attempt to stop bleeding.

Internal bleeding is often difficult (and sometimes impossible) to become aware of. Bleeding due to organ damage and skeletal injuries in the pelvic and femoral (thigh) regions can mean massive blood loss into huge cavities. A broken femur (thigh bone) can, for instance, cause an arterial rupture and more than a litre of blood can rapidly spill into the thigh area.

POSSIBLE SIGNS AND SYMPTOMS OF INTERNAL BLEEDING:

- Pain. This can be sharp local pain or dull referred pain depending on the injury
- Contusions (bruises). This is a common symptom of internal bleeding, but may not be present initially.
- Swelling
- Abnormal bleeding from body openings
- Haematemesis (blood in vomit)
- Melena (black, extremely foul smelling stool due to digested blood)
- Haemoptysis (blood coughed up by patient)
- Signs of hypoperfusion (shock) later on.

TREATMENT OF INTERNAL BLEEDING:

- Calm and reassure
- If the internal bleeding is caused by a fracture, splint it.
- Take precautionary measures to prevent the patient going into a state of shock.
- The patient desperately needs extensive professional medical care as soon as possible.

Assessing the possibility of spinal injury should be part of your initial scene size-up. You should always suspect a spinal injury in the following circumstances:

- Traffic accident
- A fall higher than the patients own height
- Severe blow to head, neck or torso
- Penetrating trauma to head, neck or torso
- Lightning strike
- Electrical shock
- Head-first dive accident
- Hangings
- If you haven't seen the incident and can't disprove the possibility of spinal injury.

SPINAL INJURY

If you decide that you suspect a spinal injury, you need to immobilise the patient immediately by supporting the patient's C-spine and preventing him/her from moving. Only when the scene is possibly hazardous, may a patient with suspected spinal injury be moved with care to a safer location.

SIGNS AND SYMPTOMS WHICH MAY INDICATE SPINAL INJURY:

- Negative change in patient's consciousness
- Difficulty breathing (dyspnea)
- Vision problems
- Inability to move body parts
- Headache
- Vomiting
- Numbness in body parts
- Loss of balance

TREATMENT OF SPINAL INJURY:

- Calm and reassure
- Support C-spine as soon as you reach the patient.
- Keep support of C-spine until proper immobilisation equipment arrives.
- Open airway using the jaw-thrust manoeuvre.
- Move patient from supine position (on back) into lateral position (on side) using the logroll method if patient needs to vomit or to slide a backboard underneath the patient.

OBSTRUCTED AIRWAY

If a conscious patient is choking you can firstly try to dislodge the foreign object by giving the patient a number of sharp blows to the back. If this doesn't work, you can perform the *Heimlich manoeuvre*. If the patient should fall unconscious, support him/her to the ground and start performing jaw-thrusts.

SHOCK (HYPOPERFUSION)

Shock is the body's inability to adequately perfuse its tissues. In layman's terms, this means that for any one of various possible reasons, the body can't provide enough oxygen to its cells. It is an extremely dangerous condition which is much easier to prevent than to treat. The body going into shock can be the aftermath of virtually any emergency and every patient should be preventatively treated.

There are various different types of shock with different instigating circumstances, but all affect the cardiovascular system and so preventing enough oxygen to reach all the body cells. The cardiovascular system has three components, namely the heart, blood vessels and the blood. If an emergency affects one of the three components, the patient can go into shock. The following are the different types of shock and a brief description:

- *Hypovolemic shock* – This refers to the loss of fluid in the body. Dehydration can cause hypovolemic shock due to the fact that body cells lose moisture. Because the cells now have a lower water concentration than normal, the cells extract more water than normal from the bloodstream. This severely affects the volume of the blood in the system and causes a severe drop in blood pressure.
- *Haemorrhagic shock* – This is a specific hypovolemic shock caused by severe bleeding.
- *Cardiogenic shock* – This refers to a failure of the heart to pump blood efficiently for any of various reasons, for example cardiac arrest.
- *Neurogenic shock* – This is the result of damage to the central nervous system, which affects control over blood vessel constriction. The affected blood vessels dilate and cause a drop in blood pressure.
- *Septic shock* – This is caused by infections. Bacteria or toxins enter the body through wounds (burns are extremely susceptible) and then damage the walls of blood vessels. This can cause blood to leak from the vessels (haemorrhage) and it can affect the constriction of vessels. Once again the blood pressure drops.
- *Respiratory shock* – A patient with difficulty breathing may get an inadequate amount of oxygen into the body. The heart will pump faster, trying to get more oxygen to its cells, but it won't work because there is little oxygen in the blood. This causes a chain reaction whereby cells deteriorate and eventually the heart will stop trying.
- *Anaphylactic shock (aka Anaphylaxis)* – This is the body's reaction to something it is sensitive or allergic to. During this allergic reaction, a widespread dilation of vessels occurs. This causes a sudden drop in blood pressure.
- *Psychogenic shock* – This is normally a temporary, widespread dilation of blood vessels due to an event which has psychological effects. For example hearing bad news, being in severe pain, sudden minor injury or sight of blood.

There are three stages of shock:

1. *Compensatory stage* – The body still try to compensate for the problem.
2. *Decompensatory stage* – The body finds its compensatory measures are failing and blood pressure drops.
3. *Irreversible stage* – “ 'Nuff said”

PREVENTATIVE TREATMENT OF SHOCK:

Calm and reassure. Place the patient supine (on his/her back) and raise the feet by about 20 – 30cm (except if you suspect a spinal injury). Cover the patient with a blanket.

SIGNS AND SYMPTOMS OF SHOCK:

- Rapid, weak pulse
- Pale or bluish skin colour
- Moist, clammy skin – possibly shivering
- Mental confusion, anxiety, restlessness or irritability
- Nausea
- Thirst
- Dazed look in eyes
- Shallow, rapid, laboured breathing

Secondary Treatment

After finishing with the primary survey and the treatment thereof, you can move on to the secondary survey during which you are going to look for further injuries, treat them, and find out more about the patient. It is important to continuously reassess the patient's primary state to ensure the patient remains stable.

You start off with a detailed head-to-toe physical examination of the patient looking for any deformities, contusions, abrasions, punctures, burns, tenderness, lacerations or swelling on the body, and also looking for possible medic alert tags. While busy with this physical exam, you can gather information about the patient, either from the patient him-/herself if he/she is conscious, or from bystanders. This is called obtaining a *SAMPLE* history, where *SAMPLE* is an acronym we use to remember what information we need:

S – Signs and Symptoms

A – Allergies

M – Medication

P – Pre-existing medical conditions

L – Last oral intake

E – Events leading up to the injury or illness

Signs refer to any information you find about the patient's condition. This includes pulse rate, rhythm and strength, respiration rate, rhythm and depth, skin colour and temperature, blood pressure, blood sugar level, capillary refill speed, oxygen saturation and pupil size and reaction. Some of these vital signs need special equipment to determine, but you should take note of as many vital signs as you can determine in the wilderness setting.

Symptoms are information that you gather from the patient about his condition. The patient will be able to tell you if he/she has any pain, dizziness, nausea etc.

The A, M and P means you need to find out if the patient has any allergies, takes any medication, or has any pertinent past medical history. The patient or by-standing family and friends would be able to tell you this, or the patient could have a medic alert tag giving such information. If the patient is a member of a group you are leading, then you should have gathered information about Allergies, Medication and Pre-existing medical conditions of your group members beforehand.

Then you have to try to find out what food or fluids did the patient take in the last couple of hours. You have to find out what was consumed, how much of it was consumed and when. Take special note of alcohol or other stimulants (like caffeine or drugs) consumed. This can give you a clue about what could be wrong with the patient, and will also be valuable information if the patient needs to undergo emergency surgery.

Events leading up to the emergency includes what the person was doing before the emergency and also what could have been the mechanism of injury.

Now you have done a physical examination and obtained a *SAMPLE* history. Next up, we are going to look at a couple of emergencies you might encounter in the wilderness.

COLD RELATED INJURIES

Conditions we are going to look at:

- Hypothermia
- Frostnip and Frostbite
- Snowblindness

Hypothermia

The human body's major organs work at a temperature of about 37°C. This is your *core temperature*; the temperature deep inside your body at the heart and lungs. Even though your *skin temperature* can fluctuate according to environmental conditions, your body is designed to keep the *core temperature* constant. Hypothermia (means "low temperature") is when the core temperature drops below what it should be, i.e. below 37°C. The body can normally tolerate a fluctuation in core temperature of a few degrees.

The body can lose heat in the following five ways:

- Conduction – Direct transfer of heat from the body to a colder object (swimming in cold water)
- Convection – Heat transfer to circulating air (windy conditions)
- Evaporation – Conversion of liquid to gas (sweating)
- Radiation – Transfer of heat by radiant energy (standing in a cold room)
- Respiration – Warm air is exhaled by the lungs and then colder air inhaled.

Air moisture (rain or mist), wind and air temperature can all be contributing factors to a drop in body temperature. Physical exertion causes sweating and increased respiration and can also be responsible for hypothermia. Injury or any other weakened state a person might be in can aggravate heat loss and make you more susceptible to hypothermia.

To protect itself against heat loss, the body can constrict blood vessels which decrease blood flow to the extremities, causing blue lips and fingers (cyanosis). Shivering is another attempt of the body to fight heat loss. The shivering of muscles uses energy and produce heat.

PREVENTION OF HYPOTHERMIA

- Know the factors which contribute to hypothermia
- Continuously assess every member of your party; watch out for early signs and symptoms
- Be prepared for the worst conditions
- Consume enough food and fluid
- Prevent splitting up of the group

THE PROGRESSIVE SYMPTOMS OF HYPOTHERMIA

The progressive drop of your body's core temperature can be divided into two stages, namely *mild hypothermia* and *severe hypothermia*. When your core temperature reaches 35°C, the body starts to lose its ability to regulate its temperature. This is the start of mild hypothermia. The patient will slow down, be quiet, incoherent and uncooperative. His/her body will be shivering and skin colour will be pale, becoming blue.

Then the patient will become very sleepy. This is the start of progression into severe hypothermia. The downward progression of the core temperature to below 32°C. The body stops shivering, the patient will lose all coordination, muscles become rigid and the patient is lethargic. The patient might develop a sensation of being warm and might start undressing. After this the patient loses consciousness and then apparent death.

Note: Even though a severe hypothermia patient might have no apparent pulse and appear to be dead, you should NEVER give up on him/her. Because of the extreme slowing down of the metabolism in these cold conditions, people can survive it.

TREATMENT OF HYPOTHERMIA

- Calm and reassure
- As soon as you recognise hypothermia in a member of your group, you should obtain immediate shelter for the whole group. Remember that if one person becomes hypothermic, the whole group is at risk.
- Get out of wet clothing
- Put on appropriate clothing (remember you are now going to be less active)
- Light a stove and make some warm food and drinks. Eat small amounts of food at regular intervals. DO NOT give alcohol, caffeine or other stimulants.
- Huddle together for warmth.
- Patient can be put in a sleeping bag, isolated from the ground.
- If hypothermia is severe, someone can be put in sleeping bag with the patient. As little as possible clothing works best for rewarming.
- Do not rub the patients hands or feet or any other extremity.

Frostnip and Frostbite

These conditions can be particularly seen in the extremities (especially fingers, ears and nose) after prolonged exposure to the cold. Frostnip is when the skin cells become frozen. Frostbite is when deeper tissues become frozen. Frostnip can thus be said to be an early stage of frostbite. This happens because of the body's reaction to cold conditions. Blood vessels constrict to reduce blood flow to the extremities. The lack of circulation of warm blood to the extremities makes these parts susceptible to freezing.

PREVENTION OF FROSTNIP AND FROSTBITE

- Be prepared for the worst conditions.
- Consume sufficient amounts of food and fluids. Stay away from alcohol, caffeine or other stimulants.
- Encourage sufficient circulation by loosening constrictive clothing.

SYMPTOMS OF FROSTNIP

- Skin of affected area is pale and cold
- Loss of feeling and sensation in affected area

SYMPTOMS OF FROSTBITE

- Initial pain in affected area
- Pale skin colour
- Affected areas feel hard, waxy and cold to touch
- Blisters and swelling may be present
- Untreated frostbite can cause cell necrosis (permanent cell death) and gangrene will develop

TREATMENT OF FROSTNIP AND FROSTBITE

- Calm and reassure
- Rewarming of affected areas should not be attempted if there is a chance that the cells may refreeze after thawing.
- Rewarm by placing affected area in lukewarm (NOT HOT!) water until completely thawed and then keep the affected area warm.
- You can also rewarm the affected area by placing it somewhere it can thaw with conduction, for example placing a frostbitten hand under a warm armpit.
- NEVER attempt to warm an affected area by rubbing it. There will be ice crystals present in and between the cells which can cause significant tissue damage if the area is rubbed.



Snowblindness

This is in effect sunburn of the eye surface (cornea). You are particularly at risk in snowed up areas, because of the intense reflection of sunlight by the snow. This condition can however also easily occur at high altitudes where there is no snow.

PREVENTION OF SNOWBLINDNESS

- Protect the eyes with good sunglasses or goggles.

SYMPTOMS OF SNOWBLINDNESS

- Initially eyes feel dry and irritated
- This develops into severe irritation and pain
- Excessive tearing
- Eyelids become red and swollen

TREATMENT OF SNOWBLINDNESS

- Calm and reassure
- Cover both eyes with moist pads
- Do not rub the eyes

HEAT RELATED INJURIES

Conditions we are going to look at:

- Heat cramps
- Heat exhaustion
- Heatstroke

As opposed to hypothermia, the condition where the body's core temperature rises above 38°C is called *hyperthermia* ("high temperature")

Heat cramps

These are severe muscle spasms caused by an electrolyte imbalance in the body. This imbalance is caused by an inadequate consumption of salts along with your fluids.

PREVENTION OF HEAT CRAMPS

Adequate salt intake along with adequate fluid intake during exercise would prevent muscle cramps.

SYMPTOMS OF HEAT CRAMPS

Painfully, severe spasms especially in the abdominal and leg muscles.

TREATMENT OF HEAT CRAMPS

- Calm and reassure
- Rest
- Give the patient an electrolyte drink like Energade or Game.

Heat exhaustion

Sweating is one of your body's temperature regulating mechanisms. You produce sweat so that it can evaporate and so your body gets cooled down. If your sweat doesn't get a chance to evaporate (like if you wear a lot of clothing) your body will continue to produce sweat in an effort to cool the body down. This can quickly result in dehydration.

PREVENTION OF HEAT EXHAUSTION

Take in enough fluids during physical exertion to replace fluids lost.

SYMPTOMS OF HEAT EXHAUSTION

- Intense thirst
- Dizziness
- Fatigue
- Nausea
- Agitation
- Incoordination
- Loss of appetite
- Pale, cold and clammy skin
- Slightly elevated body temperature

TREATMENT OF HEAT EXHAUSTION

Calm and reassure. Rest and fluid replacement

Heatstroke

This extreme form of heat exhaustion is a very serious condition. The body loses its ability to regulate its temperature. The preventative measures are the same as for heat exhaustion.

SYMPTOMS OF HEATSTROKE

- In the early stages of heat stroke, the body might still be sweating a bit, so the skin can initially be moist. However, the sweating mechanisms will breakdown rapidly causing the skin to become hot and dry.
- Rapid rise of core temperature
- Lowered level of consciousness, confusion, delirium, Incoordination, convulsions
- Rapid deterioration of condition

TREATMENT OF HEATSTROKE

- Calm and reassure
- Early treatment is essential for patient recovery. Treatment of heatstroke has one aim: Get the body temperature down.
- Rest
- Rehydrate
- Sponge the patient's body with cool (not cold!) water then fan him to encourage condensation
- Continually assess core temperature
- Seek urgent professional medical help

BURNS

Burns can be extremely painful and serious injuries. Your skin has a major role to play in the protection of your body and also in temperature control and homeostasis. With burn injuries, a patient is at risk of infection, losing his/her ability to regulate body temperature and losing a lot of water. We can differentiate between three categories of burn severity:

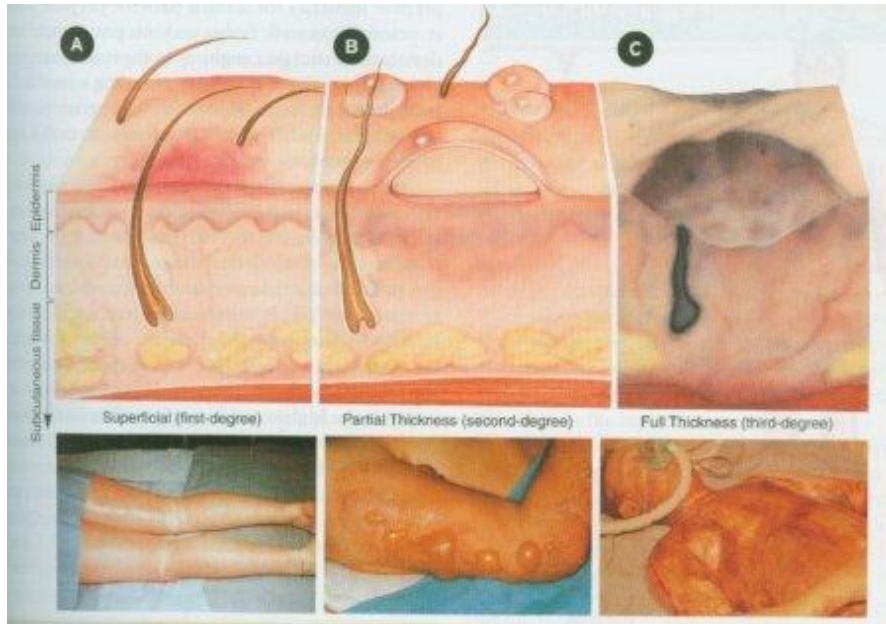
- *Minor burns*
- *Moderate burns*
- *Critical burns*

When judging the severity of the burn, we look at three main factors:

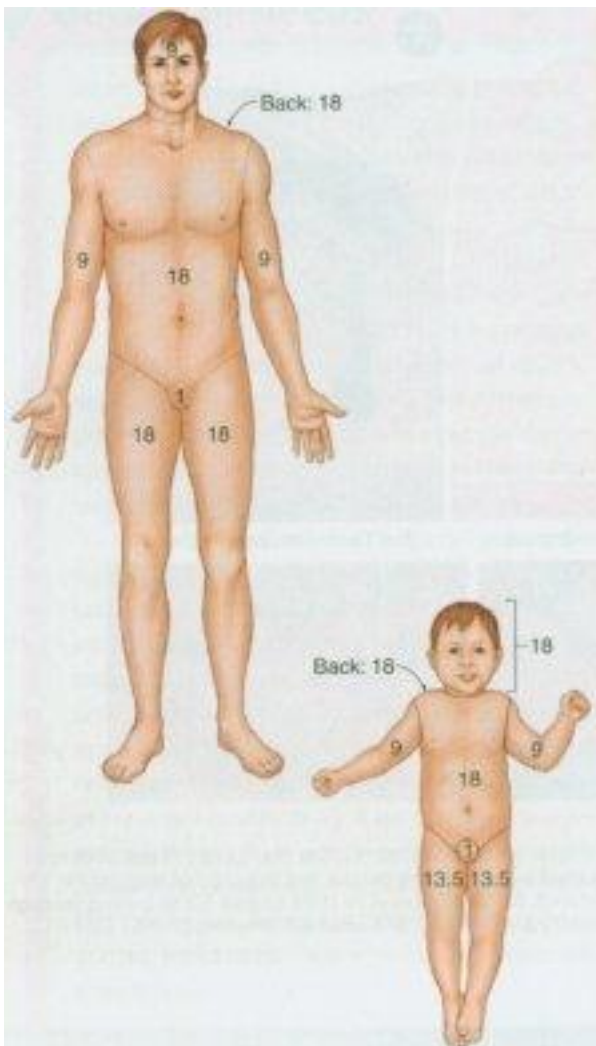
- *Depth* of the burn
- *Extent* of the burn
- *Critical areas* involved

The depth of the burn refers to the amount of skin layers which have been burnt away. There are three types of burn-depths:

- *Superficial burns* (1st degree) – These are burns which only affect the top layer of skin, called the epidermis. The skin normally turns red and the burn site is extremely painful. Sunburn is an example of superficial burns
- *Partial-thickness burns* (2nd degree) – When a burn has gone through the epidermis and into the underlying layer, called the dermis, a partial-thickness burn is formed. These can also be extremely painful, and blisters are commonly formed
- *Full-thickness burns* (3rd degree) – These are the total destruction of the epidermis and the dermis, and the burns may even extend into the subcutaneous tissue, muscle, bone or internal organs. The burned area is normally dry and leathery. Areas where a burn has affected the full thickness of the skin are normally painless because of the destruction of the pain receptors lying in the skin. However. The areas surrounding the full-thickness burn will be painful.



The extent of the burn is best determined by a calculation method called *The Rule of Nines*. The body is divided into several parts and given a percentage value. By memorizing this you can easily calculate the extent of the burn by determining which areas of the patient has burn damage.



The following areas are considered to be critical and if affected, it negatively influences the severity of the burn:

- Face
- Upper airway
- Hands
- Feet
- Genitalia
- Circumferential burns

Minor burns

- Less than 50% Superficial burns
- Less than 15% Partial-thickness burns
- Less than 2% Full-thickness burns

Moderate burns

- More than 50% Superficial burns
- 15% - 30% Partial-thickness burns
- 2% - 10% Full-thickness burns

Critical burns

- More than 30% Partial-thickness burns
- More than 10% Full-thickness burns
- Full-thickness burns to critical areas
- Burns on very young or old patients which would normally be classified as moderate burns

PREVENTION OF BURNS

Be aware of any possible situation that could lead to burn injuries. Protect your skin from the sun (even in cloudy weather). Refrain from running around in a veld fire or electrical storm. Don't smoke or cook in your tent. Be especially careful when close to a fire while wearing synthetic clothes.

TREATMENT OF BURNS

- Calm and reassure
- Remove source of burn
- Cool patient down by sponging his/her body with water of mild temperature (NOT COLD WATER) and then fan.
- Clean wound gently with antiseptic and treat with Burnshield
- Treat for shock
- Be careful with water when treating a chemical burn. Some chemicals react with water so it is important to first get rid of the chemical.

MUSCULOSKELETAL INJURIES

The body's *musculoskeletal system* includes skeletal muscle, tendons, ligaments, joints and bones, and it provides form and rigidity, movement and protection to the body. Injuries that we are going to look at which involves one or more of these components are:

- Fractures
- Dislocations
- Sprains
- Strains

Fractures

A fracture is a break in a bone and can happen in a variety of different patterns. As mentioned earlier in the module, some fractures (like spinal injury, fractured femur) can inherently be considered to be life-threatening. Other fractures might not in itself seem to be life-threatening, but can contribute to the complication of another injury. We are going to divide fractures into the two main types; *closed fractures* and *open fractures*.

Closed fractures would be any broken bone not under the skin. Open fractures are a lot more obvious. You will be able to see the broken bone protruding through the skin.

SYMPTOMS OF FRACTURES

- Local pain, increased by movement
- Deformity
- Inability to use extremity
- Swelling
- Bruising
- Crepitus – A grinding sensation of bone ends rubbing together
- Free movement – Movement where there is no joint
- Exposed fragments (Open fractures)

TREATMENT OF CLOSED FRACTURES

- Calm and reassure
- Ice can be applied to reduce swelling
- Splint injury in the most comfortable position
- Rest the injury

TREATMENT OF OPEN FRACTURES

- Calm and reassure
- Treat any bleeding (look at *penetrating injuries*)
- Don't try to push the protruding bone out of its current position
- Splint injury in most comfortable position
- Rest the injury



Dislocations

A dislocated joint can sometimes spontaneously return to its normal position. However, if this does not happen the condition is a serious problem.



SIGNS AND SYMPTOMS OF DISLOCATIONS

- Severe local pain
- Swelling
- Deformity
- Loss of normal joint motion
- Possible impaired blood circulation and/or nervous function distal to the injury

TREATMENT OF DISLOCATIONS

- Calm and reassure
- Do not be tempted to “pop” the dislocation back into place.
- Ice can be applied to reduce swelling
- Splint
- Rest the injury

Sprains

Sprains happen when a joint is twisted or stretched in an abnormal motion. As a result of this, ligaments stretch or tear.

SIGNS AND SYMPTOMS OF SPRAINS

- Local pain
- Swelling
- Bruising
- Limited motion of the joint

TREATMENT OF SPRAINS

- Calm and reassure
- Ice can be applied to reduce swelling
- Provide support to the injury, by bandaging
- Rest the injury

Strains

These are stretching or tearing of the muscle

SIGNS AND SYMPTOMS OF STRAINS

- Local pain
- Swelling
- Bruising

TREATMENT OF STRAINS

- Calm and reassure
- Ice can be applied to reduce swelling
- Provide support to the injury, by bandaging
- Rest the injury

It can be difficult to figure out which of these injuries is present when dealing with an emergency in the wilderness. It is important to take the mechanism of injury into consideration.

PENETRATING INJURIES

When a foreign object has caused an external wound, and the object remains in its penetrating position, you should never try to remove it from the wound. Leave it there for the medical professionals who are trained to remove such objects in a controlled environment. Likewise, if any internal body part is protruding through the skin, you should not try to move it back into its natural position.

SIGNS AND SYMPTOMS OF PENETRATING INJURIES

- An object penetrating the skin
- Bleeding

TREATMENT OF PENETRATING INJURIES

- Calm and reassure
- Clean the wound and control the bleeding. A *doughnut ring bandage* can be used to apply a direct pressure bandage around the object without compromising the objects position.

- If the injury involves body parts which protrude (like bone or guts), the body parts **MUST** be kept clean and moist.



ALTITUDE RELATED EMERGENCIES

Increasing altitude equals decreasing atmospheric pressure (less oxygen). This can result in problems ranging from a slight discomfort to possible death. Altitude related problems can start at as “low” as 2400m above sea level. We distinguish between three progressive conditions:

- *Acute Mountain Sickness (AMS)*
- *High Altitude Pulmonary Oedema (HAPE)*
- *High Altitude Cerebral Oedema (HACE)*

Acute Mountain Sickness

These are unpleasant symptoms which happen due to improper acclimatisation.

SIGNS AND SYMPTOMS OF AMS

- Shortness of breath
- Headache
- Dizziness
- Loss of appetite
- Nausea
- Disturbed sleep and tiredness
- General feeling of being unwell

TREATMENT OF AMS

- Calm and reassure
- Stop, rest and probably pitch camp, stay until acclimatised
- Drink lots of water

High Altitude Pulmonary Oedema

This is a serious condition where fluids accumulate in the lungs due to the low atmospheric pressure and thus separating the alveoli from the capillaries and so preventing gaseous exchange from taking place.

SIGNS AND SYMPTOMS OF HAPE

- Lots of coughing (often with pink froth coming out with the coughs)
- Headache
- Shortness of breath
- Gurgling sound from lungs
- Burning feeling in lungs
- Nausea

TREATMENT OF HAPE

- Calm and reassure
- Administer oxygen
- Evacuate immediately

High Altitude Cerebral Oedema

This is the swelling of the brain due to the low oxygen levels at high altitude. The swelling causes compression of the brain tissue and negatively affects brain function.

SIGNS AND SYMPTOMS OF HACE

- Constant headache
- Incoherence and incoordination
- Mental dysfunction, confusion, loss of memory
- Coma

TREATMENT OF HACE

- Calm and reassure
- Administer oxygen
- Evacuate immediately

BITES AND STINGS

In the wilderness we can come across bites and stings from various creatures. Some people are allergic or sensitised to certain bites and stings. We will look at allergies later on.

- Snake bites
- Spider bites
- Scorpion stings
- Insect bites or stings
- Marine life envenomations

Snake bites

Snake venom is divided into three categories according to their action:

- *Cytotoxic* – Attacks local cells (adders)
- *Neurotoxic* – Attacks the central nervous system (mambas and cobras)
- *Haemotoxic* – Attacks the blood (boomslang)

This difference between different kinds of snakes and their poisons make treatment complicated. A further complication can be psychosomatic symptoms from a non-poisonous bite or a dry bite. If you can identify the snake which has bitten your patient, you can determine the type of poison that could have been injected. Then you can anticipate what symptoms you might encounter. Snake bites should be treated symptomatically.

Cytotoxic poison attacks the tissues around the wound. Severe pain, swelling, bruising and blistering are all immediate and local symptoms. Mild nausea and headache might be later symptoms.

Neurotoxic poison is very dangerous because it attacks your body's control system. Local wound pain and swelling is likely to be minimal. Headaches, nausea, loss of muscle control, hallucinations and fits can be extremely and frighteningly rapid symptoms. The climax of the nerve damage is the loss of respiratory control.

Haemotoxic poison attacks the blood. Initial symptoms include headache and nausea. Later on the patient can start bleeding out of his/her body openings and this will eventually lead to organ failure.

TREATMENT OF SNAKE BITES

- Calm and reassure
- Try to keep the patient as inactive as possible
- Clean the bite wound
- Ice can be applied to reduce swelling
- You can splint a bitten extremity to help immobilise the patient
- DO NOT treat with antiserum unless you are qualified to do so.
- DO NOT cut the wound open
- DO NOT suck on the wound
- DO NOT blindly apply a tourniquet
- If venom were spit into the eyes of a patient, rinse the eyes for 15 minutes.

- Evacuate

Spider bites

The bites of spiders in South Africa are very rarely fatal to adults.

Symptoms differ depending on the species of spider, but generally they can all give a painful wound, headache and muscle cramps.

Treatment should again include calming and reassuring the patient, general wound treatment and symptomatic treatment.

Scorpion stings

Generally the smaller scorpion with the bigger tail is more venomous than the bigger one with the small tail. Even so, scorpion stings are rarely fatal.

SIGNS AND SYMPTOMS OF SCORPION STINGS

- Local pain
- Local swelling and discolouration
- Muscle cramps
- Convulsions
- In extreme cases: respiratory failure

TREATMENT OF SCORPION STINGS

- Calm and reassure
- Treat the wound
- Evacuate

Insect bites and stings

Wounds afflicted by insects can be complicated by allergies, but we will look at allergies later in the module. In the case of a bee sting, you should remove the sting taking care not to break the poison sac attached to its point.

Tick bites are quite common and can become a serious condition if not identified or left untreated. Treatment is with antibiotics prescribed by a doctor, so professional medical advice must be sought.

Marine life envenomations

Most marine animal stings come from Coelenterates, including jellyfish, blue bottle and sea anemone. Such stings can be very painful and cause local reddish discolouration of the skin. In extreme cases of envenomation, headaches, dizziness, muscle cramps and fainting can occur.

Tentacles should be removed by scraping it out with a blade or credit card. Vinegar can inactivate the poison. Seek professional medical help if necessary.

PRE-EXISTING MEDICAL CONDITIONS

Whether you are guiding clientele, or taking friends or family into the wilderness, you should find out beforehand if anyone has any medical conditions and make sure they take their specific medication along. You will get to deal with plenty of people with chronic conditions. Some of these people would have lived their whole lives with the condition already, and most of them know more about their condition than you will ever get to know. Common medical conditions include:

- *Allergies*
- *Asthma*
- *Diabetes*

Allergies

An allergic reaction is the body's reaction to a stimulus it has become overly sensitive to. Such a stimulus is called an *allergen*. An allergic reaction can be mild and affect the skin only (hives, itching, tenderness) or it

can be severe anaphylaxis, whereby organ systems get affected, and can be life-threatening. Allergens can be classified according to the following categories:

- Insect bites and stings – for example bee or wasp
- Medication – penicillin
- Plants – dusts and pollens
- Food – shellfish or nuts
- Chemicals – latex or soap

TREATMENT OF ALLERGIES

- Calm and reassure
- Assist the patient in administering his/her medication
- Evacuate if necessary

Asthma

An asthma attack is an acute spasm of the bronchioles (small air passages inside the lungs) associated with excessive mucus production and the swelling of the mucus lining in the airway. This excessive mucus production characteristically “creates a one-way valve” in the respiratory passages. These air passages opens easily during inspiration (breathing in), but closes when the patient wants to exhale. Asthma can thus easily be identified by a wheezing sound during exhalation. Without treatment, the patient will go into severe respiratory distress. It is important to calm and reassure the patient and to assist him/her with his/her medication. Never use someone else’s medication on your patient. It is possible that an asthma patient’s condition will not improve even with the use of his/her medication. Emergency evacuation will be imperative in such a case.

Diabetes

This is a condition where the body does not effectively produce the hormone insulin. Insulin is a substance necessary for cells to draw vital glucose from the bloodstream. Diabetics have to supplement their body’s insulin with medication. This can be with daily insulin injections or other medications.

Diabetics know their condition extremely well and they will monitor their levels during the day. However, if you deal with a diabetic client whose body is not used to the physical exertion that he/she might encounter in a wilderness experience, he/she can be quite susceptible to a diabetic emergency. There are two conditions that can lead to a diabetic emergency, namely *hypoglycaemia* and *hyperglycaemia*. Hypoglycaemia means that the glucose level in the blood is too low. This can be as a result of an over-injection of insulin, having not eaten adequately or overexertion. Hypoglycaemia can lead to *insulin shock*. Hyperglycaemia means that there is too much glucose in the blood and can lead to a condition called *diabetic coma*. This can be caused by a skipped dose of medication, diabetics who aren’t on medication and overeating.

SYMPTOMS OF INSULIN SHOCK

- Pale, moist skin
- Diaphoresis (sweating)
- Dizziness
- Headache
- Altered mental status
- Hunger
- Seizure, fainting or coma

SYMPTOMS OF DIABETIC COMA

- Dry, warm skin
- Altered mental status
- Keto-acidosis (fruity odour on the breath)

TREATMENT OF DIABETIC EMERGENCIES

In a hyperglycaemic emergency the patient needs insulin. Evacuation and hospital treatment is needed. Important to calm and reassure the patient.

In a hypoglycaemic emergency the patient needs glucose. This can easily be rectified by giving the patient something to eat (boiled sweets with high glucose content will help for a rapid recovery).

CALLING FOR HELP

Numbers which can be dialled in case of emergency:

METRO: 10177 (or 121 from a cell phone)

Netcare 911: 082 911

ER 24: 084 124

Delta Search and Rescue: 021 852 3318

Helpful details to give when calling for help:

- What happened
- Location
- Timeline
- Condition of patient
- Resources available
- What is needed
- Contact number
- Ask what they want you to do

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