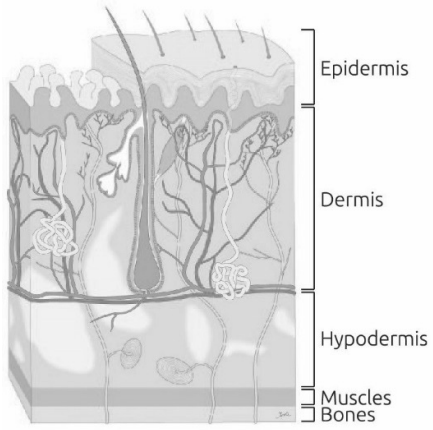
H.1 THE SKIN

Skin is the largest organ on our body, made up of several different components including water, protein, lipids and different minerals and chemicals.

Throughout life the skin changes and regenerates itself approximately every 27 days.

Proper care and treatment is essential for maintaining the health and vitality of this crucial protection.



The skin consists of three layers: *epidermis*, *dermis* and *hypodermis*.

H.1.1 THE OUTER LAYER: EPIDERMIS

It's the thinnest layer, but it's responsible for protecting you from the harsh environment, with five layers of its own: stratum *germinativum, stratum spinosum, stratum granulosum, stratum lucidum, and stratum corneum*.

The epidermis also hosts different types of cells: *keratinocytes, melanocytes* and *Langerhans cells*. Keratinocytes produce the protein known as keratin, the main component of the epidermis. Melanocytes produce the skin pigment, known as melanin. Langerhans cells prevent things from getting into the skin.

H.1.2 THE MIDDLE LAYER: DERMIS

The dermis is a complex combination of blood vessels, hair follicles, and *sebaceous* (oil) glands. Here, you'll find *collagen* and *elastin*, two proteins offering the skin's support and elasticity. *Fibroblasts* are the cells that synthesize collagen and elastin.

This layer also contains pain and touch receptors.

It is this layer that is responsible for wrinkles.

H.1.3 THE FATTY LAYER: HYPODERMIS

This layer is also known as the *subcutis*.

It hosts sweat glands, and fat and collagen cells, and is responsible for conserving your body's heat and protecting your vital inner organs.

H.2 SKIN FUNCTIONS

The main functions of the skin are protection, sensation, temperature regulation, immunity, allowing movement and growth, excretion and synthesis of vitamins.

H.2.1 PROTECTION

The skin is a natural barrier between the inside of the body and its surrounding environment. The skin protects against dehydration, UV light, microorganisms and physical trauma.

H.2.2 SENSATION

The pain and touch receptors in the dermis allow us to feel touch, pressure, heat, cold and pain.

H.2.3 TEMPERATURE REGULATION

The optimal temperature for the human body is 36 to 37 degrees Celsius (or 97 to 99 degrees Fahrenheit). A section of the brain called the *hypothalamus* controls the body's thermoregulation. It issues instructions to muscles, organs, glands, and nervous system when it senses the core internal temperature is becoming too low or too high.

One of the major functions of the skin is to help to maintain the body temperature.

H.2.3.1.1 HOW THE SKIN HELPS TO KEEP THE BODY WARM?

When the body becomes too cold, blood vessels at the body's skin surface narrow (*constrict*) to keep the warm blood in the core of the body. The activity of the sweat glands in the skin is reduced and the hairs stand on end to keep warm air close to the skin. Shivering is a method to generate heat by involuntary muscle activity.

H.2.3.1.2 HOW THE SKIN HELPS TO KEEP THE BODY COLD?

When the body becomes too hot, blood vessels at the body's skin surface widen (*dilate*) to loose heat by the increased blood flow. The activity of the sweat glands in the skin is turned up to create more sweat, which cools down the skin as it evaporates.

H.2.4 IMMUNITY

Several types of skin cells (e.g. *Langerhans cells*, *phagocytic cells*, *epidermal dendritic cells*) are responsible for the destruction of microorganisms or are involved in the interaction of the skin with the body's immune system.

H.2.5 ALLOWS GROWTH AND MOVEMENT

The elasticity of the skin allows growth, movement and adaptation of the contours of the body during movement.

H.2.6 EXCRETION

The body releases waste products from the body via the surface of the skin, regulated by the volume and composition of sweat (e.g. excretion of water, urea, ammonia and uric acid).

H.2.7 SYNTHESIS OF VITAMINS

The skin plays an important role in the synthesis of vitamin D.

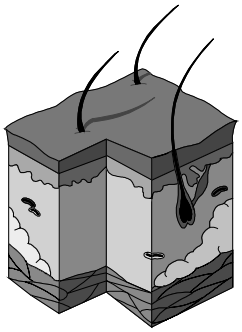
H.3 BURN WOUNDS

Burns are injuries to the skin and underlying tissue that result from the sun, heat sources, fire, hot items, boiling liquids, chemicals, irradiation, etc. However, cold can also create burn wounds!

H.3.1 FIRST, SECOND AND THIRD DEGREE BURNS

Burns are classified by the degree of skin and underlying tissues that are damaged. You will observe different signs and symptoms according to the severity of the burn wound.

H.3.1.1 FIRST DEGREE BURNS

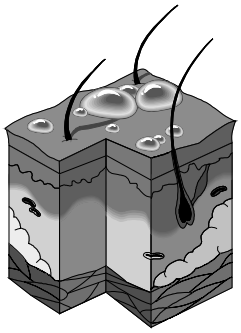


Superficial first degree burns show following signs and symptoms:

- red or darker than usual skin;
- slightly swollen skin;
- painful, but mostly bearable.

These burns usually extend only into the epidermis.

H.3.1.2 SECOND DEGREE BURNS

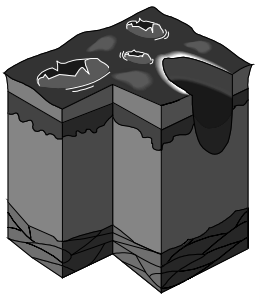


Intermediate second *degree burns show* following signs and symptoms:

- blistering,
- swelling,
- very painful.

These burns usually involve the epidermis and the dermis.

H.3.1.3 THIRD DEGREE BURNS



Deep third degree burns show following signs and symptoms

- black, parchment-like or white-looking burn wound;
- mostly dry;
- no pain inside the third degree area, but very painful in the surrounding second and first degree burned parts of the skin.

H.3.2 TYPE OF BURNS BY ORIGIN

Burns can be differentiated by their origin:

H.3.2.1 DRY BURNS

Dry burns are burns from flames, contacts with hot objects (e.g. hot cigarettes, hot domestic appliances) or friction (e.g. rope burns).

H.3.2.2 SCALDS

Scalds are burns by steam or hot liquids (e.g. tea, coffee, hot fat).

H.3.2.3 ELECTRICAL BURNS

Electrical burns are burns caused by electrical current. These burns can result from low voltage current (e.g. home appliances) or high voltage current (e.g. transformers) or by lightning strikes.

H.3.2.4 CHEMICAL BURNS

Exposure to chemical substances like industrial chemicals, corrosive gases or inhaled chemical fumes can cause chemical burns. Also, the exposure to domestic chemicals and agents as paint stripper, caustic soda, weed killers, bleach, oven cleaners or strong acids or alkali can cause burns.

H.3.2.5 RADIATION BURNS

Exposure to radioactive sources, e.g. X-rays or radiotherapy-rays, can result in radiation burns.

H.3.2.6 FROST BITES (COLD BURNS)

Cold burns like frost bites originate from exposure to cold wind, cold temperature or contact with cold freezing materials (e.g. cold metal), or can happen from contact with freezing vapours (e.g. liquid oxygen or liquid nitrogen).

H.3.2.7 SUN BURNS

Intensive exposure to sunlight, an over-exposure to ultraviolet light (UV) from a sunlamp or the sun result in sun burns.

Long exposure to heat or hot weather can also lead to heat exhaustion and heat stroke.

H.3.3 DANGER OF BURNS

Severe or large burn injuries can pose serious problems. However, any burn injury can lead to complications.

The danger from burns usually depends more on the area of the burns rather than the degree. Superficial burns over a large area of the body are more dangerous than the complete charring of a part of the limb. It must be noted that a burn is mostly a mixture itself of different degrees of burns, and that in the same person different degrees of burns may show on different parts of the body.

The most important dangers are:

- Infection

  Burn injuries leave the skin open and susceptible to infection. Burn injuries also increase your risk of sepsis, which is a life- threatening infection that rapidly travels through the bloodstream. Sepsis can cause shock and organ failure.

- Low blood volume

  Burn injuries damage the skin and the blood vessels, causing fluids to escape the body. This can result in low blood volume, known as hypovolemia. A severe loss of fluid and blood can prevent the heart from pumping enough blood through the body (resulting in shock).

- Low body temperature

  The skin helps to control the body's temperature. When a large portion of the skin is injured, the body loses heat. This increases the risk of hypothermia — i.e. when the body loses heat faster than it can produce – resulting in a dangerously low body temperature.

- Breathing difficulties

  One of the most common dangers that accompany burn injuries is the inhalation of smoke or hot air. This can burn the airways, making it difficult to breathe. Smoke can permanently damage the lungs and lead to respiratory failure.

- Pain

  Burn wounds are very painful.

- Disability

  Burn injuries form scar tissue once healed. When the skin is burned, the surrounding skin starts to pull together resulting in a post-burn contracture that prevents movement. Deeper burns can limit movement of the bones or joints when skin, muscles or tendons shorten and tighten, permanently pulling joints out of position.

H.3.4 DRY BURNS AND SCALDS (BURNS FROM FLAMES, HOT SURFACES, STEAM, …)

H.3.4.1 WHAT DO I SEE AND ENQUIRE?

Following signs and symptoms may be observed:

- The casualty has first, second and/or third degree burn wounds.
- In case of burns to the face or inhalation of hot air or smoke, you may also observe:
  - soot around the mouth or nose, or
  - scorched eyebrows, eyelashes, moustache, beard or hair

H.3.4.2 WHAT DO I DO?

H.3.4.2.1 SAFETY FIRST AND SEEK HELP

1. Make sure the situation is safe for yourself and (if possible) for the victim.
2. Shout or call for help if you are alone but do not leave the person unattended. Ask a bystander to seek help or to arrange urgent transport to the nearest healthcare facility or hospital. Tell him to come back to you to confirm if help has been secured.

H.3.4.2.2 RESCUING A PERSON FROM A FIRE:

The fire brigade is equipped and trained to rescue people from fires. It is their duty and is not the primary duty of a first aider. However, in the exceptional case you need to rescue a person from a fire yourself, follow these guidelines:

3. Make sure you have already called for help prior entering the location.

4. Have a wet handkerchief/cloth around your face. Crawl along the floor to reach and pull out the casualty as most clean air will be at lower level.
5. Act swiftly and quickly because there might be some amount of carbon monoxide also in the room. A wet handkerchief and crawling on the floor will not protect you from it.
6. Do not open other doors or windows when there is fire in the room. The rush of air will increase the fire.

H.3.4.2.3 PROVIDE FIRST AID

7. If the person's cloths are on fire:

a. stop him from running around;

b. douse the fire with water;

c. approach the person whilst holding a rug, heavy blanket, coat or cotton table cover in front of you and wrap him in it to smother the flames, or

d. make the person roll on the ground to smother the flames.

8. Cooling with water will prevent the burn from going deeper and will reduce the pain.

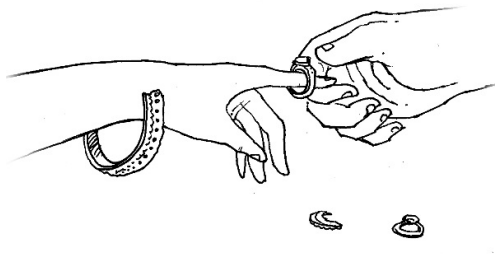
   Pour water on the burn for 10-15 minutes or until the burn stops hurting.

   Do not use very cold water for cooling the burns. Burn victims can easily become hypothermic.

9. Protect the burn victim by wrapping him in clean blankets.
10. If possible, wash your hands before taking care of the patient. Use soap and water to wash your hands. If no soap is available, you can use ash to wash your hands. Alcohol-based sanitizers can also be used, if available.
11. Put on gloves if available. You can also use a clean plastic bag.

    Try not to touch the person's wounds.

12. Cover burn wounds with a clean cotton cloth.
13. Do not open blisters – leave them intact.



14. Remove any clothing or jewellery that is not stuck to the burned skin.

    Do not remove parts of clothing or jewellery that are attached to the burn wounds.

15. If possible, remove the person's belt, shoes or boots as the limb might swell.
16. Keep the casualty warm, but do not overheat him.

17. If possible, keep burned hands, legs or feet in an elevated position.
18. Do not leave the casualty alone, and keep observing him.
19. Observe the casualty's breathing, especially when the person is burned in the face and exposed to heat or has breathed in a lot of smoke or hot air.
20. In case of severe burns, transport the casualty as quickly as possible to the nearby healthcare facility or hospital.

H.3.4.2.3.1 WHAT DO I DO IF THE PERSON IS UNCONSCIOUS, BUT IS STILL BREATHING?

a. Put the person in the recovery position, if possible.
b. Continue to observe the victim and check his breathing

H.3.4.2.3.2 WHAT DO I DO WHEN THE PERSON STOPPED BREATHING?

Perform CPR.

Do not interrupt the resuscitation until:

- the person starts to wake up, moves, opens his eyes and breathes normally;
- help (trained in CPR) arrives and takes over;
- you become too exhausted to continue; or
- the scene becomes unsafe for you to continue.

H.3.4.2.4 HYGIENE

Wash your hands after taking care of the patient. Use soap and water to wash your hands. If no soap is available, you can use ash to wash your hands. Alcohol-based sanitizers can also be used, if available.

H.3.4.3 WHEN TO REFER A BURN VICTIM TO A HEALTHCARE FACILITY OR HOSPITAL?

Always arrange urgent transport to the nearest healthcare facility and seek medical help straight away in a healthcare facility or hospital if:

- the injured person is under five years old or over 65 years old;
- the burn is on the face, eyes, ears, hands, feet, the sexual organs or joints;
- the burn circles the entire limb, body or neck;
- the burn is equal or larger than the injured persons hand size;
- the burn looks black, white, papery, hard and dry;
- the injured person has a decreased or no sense of feeling in or around the wound;
- the burns were caused by electricity, chemicals or high pressure steam;
- the injured person has inhaled flames or hot air, or breathed in a lot of smoke;
- clothing or jewellery is stuck to the skin;
- the victim suffers any other serious trauma due to the accident;
- the victim suffers from a medical condition, like diabetes; or
- the person's condition is getting worse.

H.3.5 CARE OF MINOR BURNS (SMALL FIRST AND SECOND DEGREE BURNS)

For minor burns (small first and second degree burns) you can use fresh aloe vera or honey if available to cover the burn wound. This will help the wound to heal faster.

H.3.5.1 HYGIENE

1. Wash your hands before taking care of the sick person. Use soap and water to wash your hands. If no soap is available, you can use ash to wash your hands. Alcohol-based sanitizers can also be used, if available.

   Use gloves to protect yourself. If no gloves are available, you can use a clean plastic bag. Try not to come in contact with the person's vomit, stools or fluids.

H.3.5.2 PROVIDE FIRST AID

After cooling down the burn wound (see above on how to approach the casualty):

2. Dress the wound with a clean cotton cloth.

3. Do not apply any medicine to the burns.

   Do not apply cotton wool to cover the burns.

   Do not use Vaseline to cover the burns.

   Do not apply any pastes or creams to the burns.

4. Make sure the burned casualty has sufficient fluids to drink.
5. Refer the victim to a healthcare facility for further management.

H.3.5.3 WHEN TO REFER A BURN VICTIM TO A HEALTHCARE FACILITY OR HOSPITAL?

Always refer the victim to a healthcare facility for further management.

Advise the injured person to seek medical care if in the days after:

- the burn smells bad,
- there is any discharge from the wound or the wound is soaked with pus,
- the pain remains or increases,
- there is swelling, or
- if he gets fever.

H.3.6 SPECIFIC BURN LOCATIONS

H.3.6.1 BURNS TO THE FACE

The casualty having burned in the face or breathed in hot air or smoke, may experience difficulty in breathing:

- Approach the casualty as described for burns and scalds.
- Allow the casualty to take a position that allows him to breathe best and is most comfortable.
- Loosen clothing that might hinder easy breathing.
- Especially observe the casualty's breathing and start CPR, if required.
- Always transport these burn victims urgently to a healthcare facility or hospital.

H.3.6.2 BURNS TO THE EYE

Flames or hot substances may have burned the eye(s).

Following signs and symptoms may be observed:

- scorched eyebrows, eyelashes;
- burn wounds around the eye; or
- red eyes with burning and itching sensation.

In case of burns to the eye:

1. Shout or call for help if you are alone but do not leave the person unattended. Ask a bystander to seek help or to arrange urgent transport to the nearest healthcare facility or hospital. Tell him to come back to you to confirm if help has been secured.

2. Rinse the eye immediately with plenty of water for 10-15 minutes, preferably from the nose outwards.

   Use clean water or water that has been boiled and cooled. Be careful: Room temperature water is more comfortable than cold water. Very warm water might burn the eye.

   Make sure no liquid or rinsing water runs into the other eye.

3. If the person wears contact lenses, ask the person to take them out and keep them in a safe place.
4. Arrange transport to the nearest healthcare facility or hospital.

5. Do not put medication into the eye.
6. Eye injuries have to be managed always with great care. Always refer these victims to the nearest healthcare facility or hospital.

H.3.7 ELECTRICAL BURNS AND ELECTROCUTION BY ELECTRICITY OR LIGHTNING

Electrical burns are caused when electricity passes through the body.

The electricity source may be e.g. lightning or contact with household current, high voltage cables or transformers, or low voltage - high ampere electricity from a car, truck or tractor battery. Do not touch the casualty till the power switch has been turned off.

The electricity enters the body at the point of contact, goes through the body and exits at the point where the body touches the ground or at earth point. Often burn wounds may be observed at these entry and exit points. But inside the body the electricity can cause damage on its track that remains hidden.

Exposure to electricity can also cause cardiac arrest.

H.3.7.1 WHAT DO I SEE AND ENQUIRE?

Following signs and symptoms might be observed:

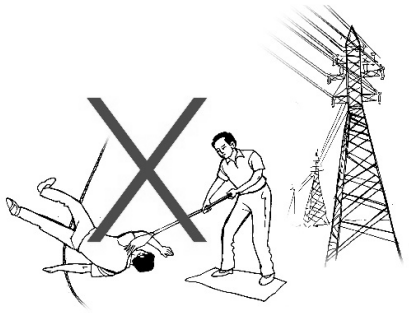
- Based on the situation you may be able to detect there has been an electrocution accident (e.g. you notice an electrical appliance connected to the electrical net next to the casualty, a high voltage wire might be next to the casualty, thunderstorm, …).
- The casualty may:
  - be unconscious,
  - have difficulty in breathing or have stopped breathing,
  - be in cardiac arrest (no beating heart) or have an irregular pulse,
  - have burn wounds, or
  - have muscle spasms.

H.3.7.2 WHAT DO I DO?

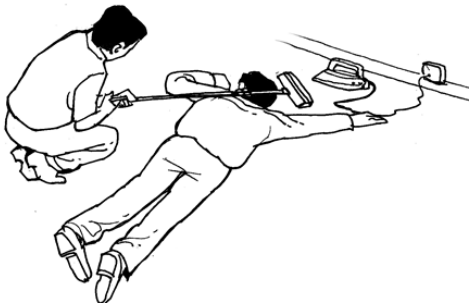
H.3.7.2.1 SAFETY FIRST AND CALL FOR HELP

1. Never touch a casualty that still is connected to an electrical source!

2. Turn off the source of electricity.



a. In case of high voltage currents, never try to move the wire or source of electricity away from the victim. High voltage current (+ 1000 Volt) can jump and kill up to 18 metres. Wait till the high voltage source has been turned off prior approaching the victim.



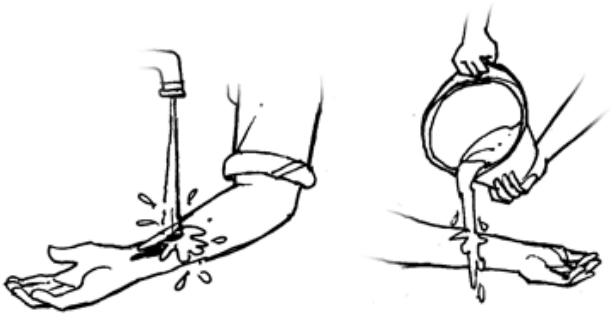
b. In case of electrocution by home electricity (220V) and if you cannot switch off the electric source, you may try move the source away from both you and the injured person using a dry, non-conducting object made of cardboard, plastic or wood.

c. In case of strike of lightning, make sure you and the victim stay safe. If you are at risk from ongoing lightning, wait until danger has passed. If possible stay inside a house or in a car.

3. Shout or call for help if you are alone but do not leave the person unattended. Ask a bystander to seek help or to arrange urgent transport to the nearest healthcare facility or hospital. Tell him to come back to you to confirm if help has been secured.

H.3.7.2.2 PROVIDE FIRST AID

4. Try not to move the casualty, except if he is in immediate danger.



5. Cool down the burn wounds. Use clean water. If there is no clean water available, use the available water.

   Only do this, if there is no danger of further electrocution: make sure the current has been switched off.

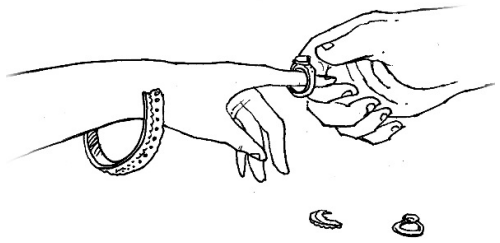
   a. Pour water on the burn for 10-15 minutes or until the burn stops hurting.

   b. Do not use very cold water for cooling the burns. Burn victims can easily become hypothermic.

6. Protect the burn victim by wrapping him in a clean sheet of cloth or blankets.
7. If possible, wash your hands before taking care of the patient. Use soap and water to wash your hands. If no soap is available, you can use ash to wash your hands. Alcohol-based sanitizers can also be used, if available.
8. Put on gloves if available. You can also use a clean plastic bag. Try not to touch the person's wounds.

9. Cover burn wounds with a clean cotton cloth.

10. Do not open blisters – leave them intact.



11. Remove any clothing or jewellery that is not stuck to the burned skin.

    Do not remove parts of clothing or jewellery that are attached to the burn wounds.

12. If possible, remove the person's belt, shoes or boots as the limb might swell.
13. Keep the casualty warm, but do not overheat him.

14. If possible, keep burned hands, legs or feet in an elevated position.
15. Do not leave the casualty alone, and keep observing him.
16. Transport the casualty as quickly as possible to the nearby healthcare facility or hospital.

H.3.7.2.2.1 WHAT DO I DO IF THE PERSON IS UNCONSCIOUS, BUT IS STILL BREATHING?

a. Put the person in the recovery position.
b. Continue to observe the victim and check his breathing

H.3.7.2.2.2 WHAT DO I DO WHEN THE PERSON STOPPED BREATHING?

Perform CPR.

Do not interrupt the resuscitation until:

- the person starts to wake up, moves, opens his eyes and breathes normally;
- help (trained in CPR) arrives and takes over;
- you become toexhausted to continue; or
- the scene becomes unsafe for you to continue.

H.3.7.2.3 HYGIENE

Wash your hands after taking care of the patient. Use soap and water to wash your hands. If no soap is available, you can use ash to wash your hands. Alcohol-based sanitizers can also be used, if available.

H.3.7.3 WHEN TO REFER THE VICTIM TO A HEALTHCARE FACILITY?

Always seek medical help straight away in a healthcare facility or hospital if:

- the person got electrocuted by a high voltage source or got struck by lightning;
- the injured person is under five years old or over 65 years old;
- the burn is on the face, eyes, ears, hands, feet, the sexual organs or joints;
- the burn circles the entire limb, body or neck;
- the burn is equal or larger than the injured persons hand size;
- the burn looks black, white, papery, hard and dry;
- the injured person has a decreased or no sense of feeling in or around the wound;
- clothing or jewellery is stuck to the skin;
- the victim suffers from any other serious trauma due to the accident;
- the victim suffers from a medical condition, like diabetes; or
- the person's condition is getting worse.

H.3.8 CHEMICAL BURNS

Some chemicals may irritate, burn or penetrate the skin and cause damage, sometimes even death. Unlike burns by heat or electrocution, these burns may develop slowly.

Chemical burns are always to be considered serious and always require medical follow up.

H.3.8.1 WHAT DO I SEE AND ENQUIRE?

Following signs and symptoms may be observed:

- There may be evidence of chemicals in the vicinity of the casualty.
- The victim may complain of intense stinging pain.
- At the body parts that came into contact with the chemical:
  - The skin may be irritated or burned.
  - The skin may be discoloured.
  - The skin may be swollen.
  - The skin may show blisters.
  - The skin may peel off.
  - There may be signs of poisoning (see chapter on Poisoning).

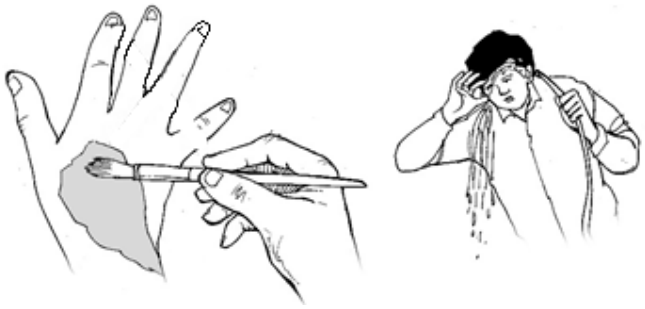
H.3.8.2 WHAT DO I DO IF THE VICTIM'S SKIN IS BURNED BY A CHEMICAL?

H.3.8.2.1 SAFETY FIRST AND CALL FOR HELP

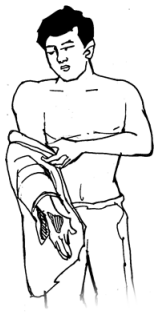
1. Make sure the area is safe for you and the victim and make sure you do not come into contact with the chemical yourself unprotected.
2. Shout or call for help if you are alone but do not leave the person alone. Ask a bystander to seek help or to arrange urgent transport to the nearest healthcare facility or hospital. Tell him to come back to you to confirm if help has been secured.

H.3.8.2.2 PROVIDE FIRST AID

3. Wear gloves to protect yourself. If no gloves are available, use a plastic bag to cover your hands.



4. Remove the cause of the burn by first brushing off any remaining dry chemical and then rinsing the chemical off the skin surface with cool, gently running water for 10 to 15 minutes.



5. Remove clothing or jewellery that has been contaminated by the chemical.

6. Wrap the burned area loosely with a clean cloth.
7. Rewash the burned area for several more minutes if the person experiences increased burning after the initial washing.
8. Arrange transport to the nearest healthcare facility.

H.3.8.2.2.1 WHAT DO I DO WHEN THE CHEMICAL HAS BEEN SWALLOWED OR BREATHED IN?

Approach the casualty as described in the chapter 'Poisoning'.

H.3.8.2.2.2 WHAT DO I DO WHEN HARMFUL LIQUIDS WERE SPILLED IN THE EYE?

Approach the casualty as described in the chapter 'Burns to the eye'.

H.3.8.2.2.3 WHAT DO I DO IF THE PERSON IS UNCONSCIOUS, BUT IS STILL BREATHING?

a. Put the person in the recovery position.
b. Continue to observe the victim and check his breathing.

H.3.8.2.2.4 WHAT DO I DO WHEN THE PERSON STOPPED BREATHING?

Perform CPR.

Do not interrupt the resuscitation until:

- the person starts to wake up, moves, opens his eyes and breathes normally ;
- help (trained in CPR) arrives and takes over;
- you become too exhausted to continue; or
- the scene becomes unsafe for you to continue.

H.3.8.2.3 HYGIENE

Wash your hands after taking care of the patient. Use soap and water to wash your hands. If no soap is available, you can use ash to wash your hands. Alcohol-based sanitizers can also be used, if available, but may not remove the chemicals from your hands completely.

H.3.8.3 WHEN TO REFER TO A HEALTHCARE FACILITY?

Always transport the victim of chemical burns urgently to the nearest healthcare facility or hospital.

H.3.9 SUNBURNS, SNOW/WELDERS EYES, HEAT EXHAUSTION AND HEAT STROKE

H.3.9.1 SUNBURNS

Direct exposure to sunlight can have ill effects on the skin and eyes.

The injury to the skin is known as "sunburn". It is caused by the exposure to ultraviolet rays from the sun. When UV B rays penetrate the deeper skin layers damage to the cells occurs. The skin becomes red and painful. In some cases the damage to the cells is so severe resulting in skin peeling and blistering.

Strong or cool wind or a body covered by water or sweat might give the sunbathing person a falsely reassuring effect of not being sunburned. As clouds have less limiting effect on UV radiation than they do on temperature, sunburns still can happen on cloudy days. White surfaces such as snow or sand reflect UV radiation and so increase the risk of sunburn. Rippling water and rough sea reflect more UV radiation than calm open water. Sunlight has a shorter distance to travel in order to reach the earth's surface in areas closer to the tropics; UV radiation levels will therefore, be higher in these areas because there is less dissipation of the rays as they travel to earth. The level of UV radiation also increases with altitude as the atmosphere becomes thinner and there is less absorption of the radiation.

H.3.9.1.1 WHAT DO I SEE AND ENQUIRE?

Following signs and symptoms may be observed when a person suffers a sunburn:

- reddened skin,
- warm skin, and
- pain of varying degrees.

In more severe cases:

- swelling,
- blistering, and
- weeping skin.

H.3.9.1.2 WHAT DO I DO?

1. Bring the casualty to a shaded cool place. If this is not possible, cover the skin with light clothing or a towel.

2. Cool down the skin by sponging or by slowly showering for about 10-15 minutes. Be careful not to overcool the casualty: do not use too cold water.

3. Encourage the casualty to have frequent sips of cool water (this is an exception to the standard first aid guideline of not giving a casualty to drink or to eat).
4. For severe burns, refer the casualty to the nearest healthcare facility.

   For minor burns, an after-sun cream may be applied.
5. Wash your hands after taking care of the patient. Use soap and water to wash your hands. If no soap is available, you can use ash to wash your hands. Alcohol-based sanitizers can also be used, if available.

H.3.9.1.3 WHEN TO REFER TO A HEALTHCARE FACILITY?

Always refer the casualty to the nearest healthcare facility if:

- The burns cover a large body surface.
- There are blisters.
- The casualty is a child or an elderly person.
- When you notice signs of a heat stroke (see chapter on Heat stroke).

H.3.9.2 SUNBURN OF THE EYE AND SNOW OR WELDERS BLINDNESS

Snow blindness or sunburn of the eye (also known as *photokeratitis* or *ultraviolet keratitis*) is a painful eye condition caused by exposure of insufficiently protected eyes to the ultraviolet rays. Common causes are looking into welding light without eye protection; exposure to sunlight reflected from snow and ice without wearing sun glasses, or looking directly into sunlight (e.g. looking at a solar eclipse) without using the appropriate protection.

H.3.9.2.1 WHAT DO I SEE AND ENQUIRE?

Following signs and symptoms may be observed when a person suffers a sunburn of the eye(s) or suffers snow or welders blindness:

- The casualty complains of intense pain in the affected eye(s).
- The eye(s) is (are) red.
- The eye(s) have tears.
- The casualty may be sensitive to light.
- The casualty may report having stared directly into the sun or into strong light (like welding light or fireworks)

H.3.9.2.2 WHAT DO I DO?

1. Reassure the casualty.
2. If the person wears contact lenses, ask the person to take them out and keep them in a safe place.

   Ask the casualty to protect his eye(s) by holding a non-fluffy pad to each injured eye. Eventually, the eye pads may have been wetted with clean water. If no eye pad is available, ask him to keep the eyes closed or use sunglasses.

   Put no pressure on the eyes.

3. Arrange transport to the nearest healthcare facility or hospital.
4. Do not put medication into the eye.
5. Refer the casualty to a healthcare facility.
6. Wash your hands after taking care of the patient. Use soap and water to wash your hands. If no soap is available, you can use ash to wash your hands. Alcohol-based sanitizers can also be used, if available.

H.3.9.2.3 WHEN TO REFER TO A HEALTHCARE FACILITY?

Eye injuries have to be managed always with great care. Always refer these victims to the nearest healthcare facility.