DAN First Aid

Student book / EN

Helping Divers Since 1983

DAN
DIVERS ALERT NETWORK EUROPE


Helping Divers Since 1983

DAN First Aid

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Table of Contents

DAN First Aid course

Course Overview

The DAN First Aid provider programme is designed to teach you the skills and knowledge needed to perform first aid to injured persons.

Knowledge Development (3 to 4 hours)

The Knowledge Development portion of this course is designed to provide information that will allow you to:

1. Recognize health problems which are not immediately life threatening
2. Evaluate the condition of an injured person and perform effective, correct first aid
3. Evaluate when it is necessary to activate EMS
4. Perform an injury and illness assessments
5. Secure a wound and bandage it using the correct techniques
6. Splint a dislocated limb
7. Move an injured person
8. Treat hypothermia
9. Treat heat exhaustion and heat stroke

You will attend a lecture provided by your DAN First Aid Instructor. This lecture supports the information presented in this handbook. The handbook supplies information in a simple, easy-to-understand manner.

Skills Development (5 to 6 hours)

The skills development portion of the course will give you an opportunity to perform First Aid skills, under the guidance of a DAN First Aid Instructor. This hands-on part of the course is designed to have you apply what you have learned in the knowledge development part of this course.

Assessment and Certification

Upon completion of the DAN First Aid course, you will receive a DAN First Aid Provider certification card indicating that you have been trained to provide First Aid.

Prerequisites

To participate in the DAN First Aid course you need to have a current (not older than 24 months) certification in CPR (a.k.a. Basic Life Support – BLS). The DAN Basic Life Support course is a recommended prerequisite.

Learning Objectives

At the end of this programme, you will be able to perform First Aid by:

1. Performing an injury and illness assessment
2. Securing and bandaging a wound using the correct techniques
3. Splinting a dislocated limb
4. Moving an injured person
5. Managing mild and severe hypothermia
6. Managing heat exhaustion and heat stroke

Remark:

This manual is made according to the 2007 ERC Guidelines for First Aid

Although this handbook will positively influence the learning process before and during a First Aid course, the book alone will not train you as a First Aid provider.

In order to be able to perform the techniques described in this book you must participate in a First Aid course, organised by a qualified and active DAN First Aid Instructor.

This book is also a valuable resource for after your First Aid course.

Visit the **DAN Europe website** to find out what DAN Europe is and what DAN can do for you! The website contains a wealth of information about DAN membership and its advantages, **Dive Medicine, Diving Safety, Dive Research, DAN Training programs** and much more...

The **online catalogue** gives you the possibility to order DAN Europe materials online, with special discounts for DAN Europe members.

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First Aid

1.1 What is First Aid?

First Aid is the care you provide to an injured person with injuries or illnesses which are not immediately life threatening. When the airway and breathing are secured we can use appropriate techniques to lend assistance.

During First Aid we can:

- Relieve the pain
- Stop the injury from getting worse
- Determine the type and severity of the injury and Illness during an Injury and Illness assessment

After you have stabilised an injured patient and addressed any immediate health concerns, it is a good idea to perform a secondary assessment to see if there are any other injuries or complications you weren't aware of when you began providing first aid. Talk to the injured person to determine where he might have problems or feel some discomfort. Focus on these areas.

History and the mechanism of injury 1.2

While talking to the injured person you should gather and record a history of the events leading up to the situation. If it were a traumatic event, you should determine what brought on the situation and determine the mechanism of injury. This information is important to help determine the severity of the injury. You'll also want to find out if the patient has any medical issues that may complicate providing care, or previous injuries to the same area that may confuse your findings.

Vital signs 1.3

You should record the patient's pulse and breathing rates. Do both for 30 seconds and multiply by two. When counting respirations, do not let the patient know you are monitoring breathing, as people have a tendency to focus on their own breathing and alter their breathing patterns.

Fig1:
First Aid

Fig 2:
Do not apply pressure if you are taking the pulse at the carotid artery, on either side of the windpipe.

Fig 3:
Take the pulse with your pointer and middle finger placed gently on the inside of the wrist, below the thumb

Continue holding the patient's wrist for the second 30-second period while you count breaths, or it may be helpful to have a bystander count respirations.

Normal pulse rates are between 60 and 100 beats per minute, and normal respiration rates are 12 to 20 breaths per minute. If you have been trained to do so, it is also helpful to determine the injured patient's blood pressure.

Important info can also be obtained by observing the injured or sick person's color and by checking his/her temperature and look for the presence of sweat/moisture.

Where to find the "pulse"

It can be found in any place that allows for an artery to be compressed against a bone, such as at the neck (carotid artery) and at the wrist (radial artery). Never check the pulse using your own thumb to avoid feeling your own heartbeat.

Carotid Artery - large arteries bringing blood to your brain. One artery on each side of your throat. Found between your mastoid muscle (muscle at the side of the neck) and your trachea. Place your index and middle finger between them. Press in firmly (but not overly) to "shut off" the flow of blood. Do not check both sides of the carotid artery simultaneously, as it might reduce or shut of the blood flow to the brain.

Radial Artery - large arteries near your radial bone.

1. Most easily located between your "flexor" tendons (muscles in the middle of the wrist) and your radial bone (the bone at wrist at the side of the thumb).
2. Hold your wrist at heart level for stronger sensation.

3. Use your index and middle finger to move between tendons and radial bone.

How to check the respiration

Respiration can be found by observing the chest to rise and fall or by placing your hand on the chest.

1.4 Patient assessment process & goals of patient care

Performing First aid does not means you must rush and start providing first aid, without first obtaining some important info.

Some info is important to decide what would be the next steps for you to do.

However, it is not your task to make a diagnosis, but important to collect all info that would help health care personnel to make one.

Fig4:
Take vital signs and check breathing

The goal is a systematic examination of the injured person to identify non-life threatening conditions and injuries. The components of the patient assessment process include the scene survey, initial assessment (ABCs) and rapid trauma assessment or detailed physical exam (in accordance with ERC guidelines).

As you approach, make always sure that your own safety is not compromised. Potential hazards could be i.e. structures, vehicles, fire, gases, animals and electrical danger.

If not necessary (not life threatening), do not move the injured person and if it is possible report the history of the incident.

Sometimes the cause of a trauma may not be clear if you do not work in a systematic way.

You see a person who has been riding his/her bike and has fallen as a cause of a crash or possibly a heart attack. You suspect a spinal injury, and you must take the appropriate assessment, but you should not neglect the possible heart condition.

Following a guideline is important to provide an appropriate First Aid. It is also important to re-evaluate the injured person as a part of the continuous care you should provide to the injured person.

Initial or Primary assessment 1.5

The primary assessment is not the same as checking the ABCs in the BLS procedure. While BLS is used to provide immediate care to a seriously injured person, the primary assessment is used to get more detailed info about the general condition of an injured person.

The primary assessment consists of Airway, Breathing, Circulation, Disability and limited exposure

A - Airway: If you suspect trauma, before speaking to the injured person, hold the head with both hands to stabile the cervical spine. Speak to the person and assess the response. If he/she is able to speak, ask for the history. Check to see if there is any potential for airway obstruction by a foreign body, oedema, etc. If appropriate, inspect the mouth and remove any debris using finger sweep.

If the injured person is unresponsive, continue BLS.

B - Breathing: Normal breathing is quiet and hard to detect. Observe the respiratory effort noting the rate and check for cyanosis (blue lips and / or nails) or extreme pallor. Check for bilateral chest expansion. The normal respiratory rate is 12 to 20 breaths a minute

C - Circulation: Check the carotid pulse and note the rate. The normal pulse rate is 60-100 beats a minute. Note any extreme pallor or sweating which may indicate shock.

D - Disability: the neurological condition can be rapidly assessed using the AVPU code:

A - Alert: is the person alert?
V - Verbal stimuli: Does he/she only respond when spoken to?
P - Painful stimuli: Does the person only respond to painful stimuli?
U - Unresponsive: is the injured person totally unresponsive?

Note:
The First Aid provider needs to stabilise the injured person and should take into consideration the major injuries, risk of shock and distance to the Medical Facility in order to make the correct decisions.

E – Exposure: Limited exposure of areas of the injured person's body that require further evaluation (Assessment of the major injuries). Obviously no time should be lost doing a detailed assessment of injured persons whom you have already determined to be critically ill and to require immediate hospitalization. This procedure may well come into the secondary assessment, discussed later in this book.

1.6 Arrival of EMS

Upon the arrival of the EMS it remains important to inform them about what happened.

During a call someone may have reported a traffic accident with one person injured, and requested help.

However, when you provided care and did the assessments, you obtained important information that is valuable to the healthcare providers arriving at the scene.

Therefore, when you hand over an injured person you should communicate:

Mechanism of injury: How did the accident happen, and what exactly happened?

Injuries found: Which Injuries did you find?

Signs and Symptoms: What where the signs and symptoms? (including previous medical history if known)

Treatment given: Inform the EMS about the first aid you provided.

The acronym **MIST** can be used to make sure you covered the above.

SECTION 1

REVIEW QUESTIONS
(Multiple answers possible)

1. **During First Aid we can:**
   a) Relieve the pain
   b) Stop the injury from getting worse
   c) Determine the type and severity of the injury and Illness during an Injury and Illness assessment

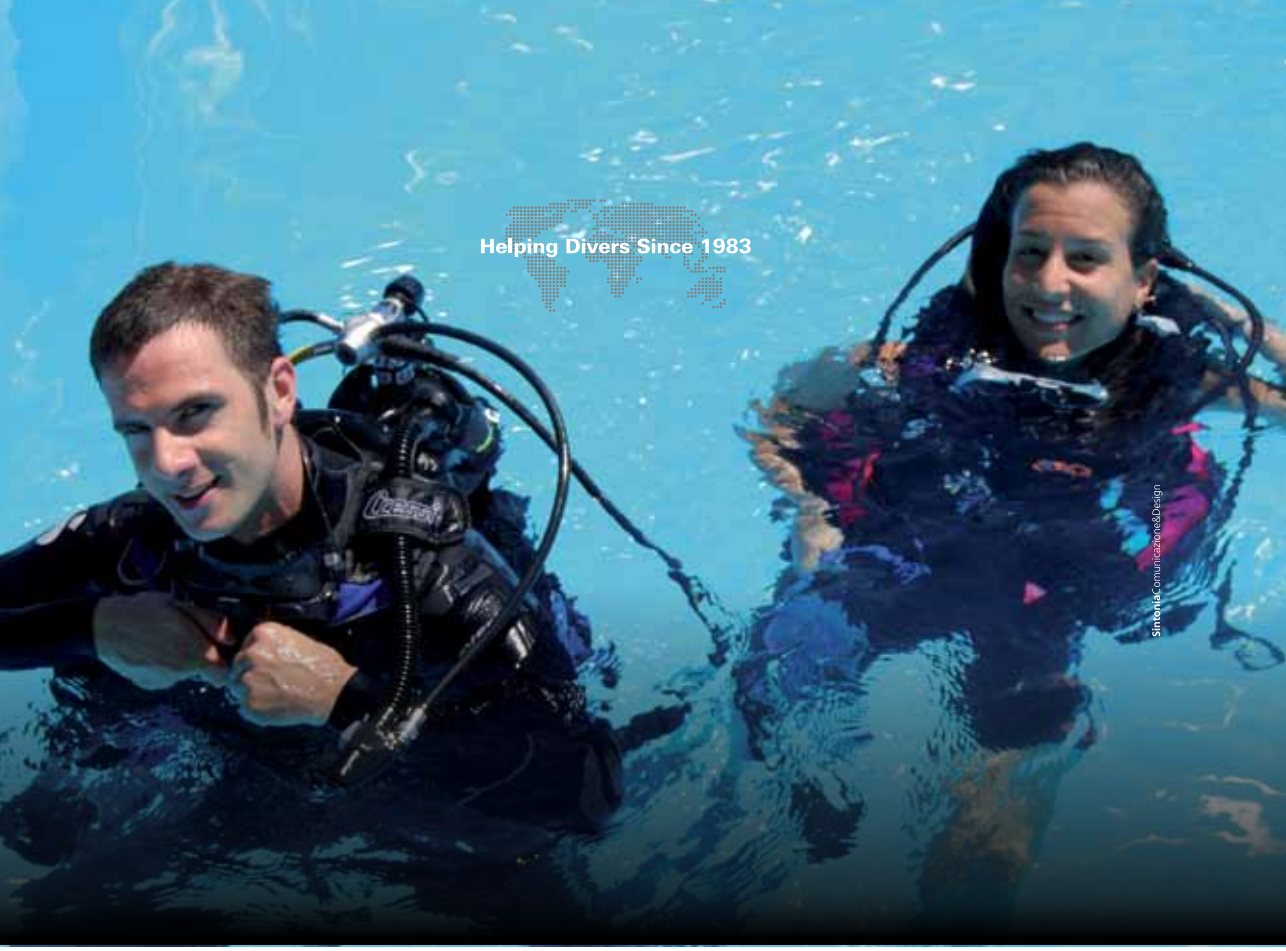
2. **The neurological condition can be rapidly assessed using the AVPU code. What does the P stand for?**
   a) Injured person reacts to pain only
   b) Injured person does not react to pain
   c) Injured person reacts to verbal stimuli

3. **What are the normal pulse rates for a healthy adult?**
   a) 60-80
   b) 40-60
   c) 60-100
   d) There is no normal rate

4. **The normal respiration rate for a healthy adult is 12-20 breaths per minute.**
   a) True
   b) False

5. **When handing over an injured person the First Aid provider should communicate at least:**
   a) The number of his first aid license
   b) Mechanism of Injury; Injuries found; Signs and Symptoms and Treatment given
   c) Mechanism of Injury; Injuries found; Signs and Symptoms and tell the EMS what to do next
   d) There is no need to communicate. EMS will know what happened

Review answers can be found at the end of the book



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Injury Assessment

What is an injury assessment or secondary assessment? 2.1

An injury assessment is an assessment of the injured person's entire body after an accident. During this assessment the rescuer examines the body and looks for abnormalities and/or pain.

It might be possible that a person who complains about pain in the shoulder also has an injured leg, but if you do not examine him and notice the second injury, he may have not told you or noticed it himself.

Your actions depend on the results of the assessment. While it is needed to provide immediate care for life threatening injuries, it is wise to perform a complete assessment, in order to establish the severity of the injuries and to determine what to do first. This assessment should not be done if the injured person is suffering from a life threatening injury.

If the patient is unconscious, you may need to scan the entire body to check for problems. It is entirely possible, however, in the process of providing basic life support, you'll never get around to performing a secondary assessment.

The secondary assessment includes:

F – Family, friends, Fahrenheit: Make sure the injured person is kept warm, but not overheated. Also be considerate to the patient's friends and family. You might also gain valuable information from them.

G – Get Vital Signs: Regular monitoring of the pulse, respiratory rate and observing any changes in the responsiveness is an essential part of the continuous care you provide to the injured person.

H – Head to Toe Assessment: The injured person should be examined using a "look, listen, feel" technique. Starting at the injured persons head and working systematically down to the feet, the injured person is examined for further injuries.

I – Inspect the back: This is an important part of the Injury assessment, especially after a trauma caused by an accident. It might be difficult to check the back whilst the injured person is in fully clothed or lies on his back, therefore, unless there is significant blood loss from the back, it is best to avoid unnecessary movement.

2.2 How to perform an injury assessment?

Fig 5 - 6:
Starting from the head. Observe and feel the presence of any cuts, abrasions or other signs of injury

Fig 7:
Check for fluid or blood in the ears, nose, mouth.

Before you begin this "head-to-toe" assessment, remember to be SAFE and protect yourself from bodily fluids by using gloves.

To begin, you will need to stabilise the injured person's head and not allow to move his/her head. The injured person should not answer questions by nodding the head.

Use your eyes and hands to find any abnormalities or possible problems and ask the injured person to inform you when he feels pain or discomfort.

Inform the injured person about what you are doing and constantly scan the body.

Start feeling (gently) at the head (skull) for deformities and watch for any fluid that may be blood. Note any reaction to your touch.

Scan the patient's face (forehead, nose, cheeks and chin) with your finger tips to see if there are any broken bones underneath the skin. Also check the patient's nostrils for blood or discharge.

You should also scan the patient's ears for blood or any fluid. The presence of blood or fluid in the ears would confirm a head injury.

From there, position your hands on the patient's neck. You should understand the mechanism of injury to know if a head or neck injury is likely.

Fig 8:
Compare the clavicles and shoulders

Fig 9:
Check shoulders for signs of injury and pain

Move in front of the patient and shade his eyes from the sun or lights. Do this one eye at a time to see if they dilate in response to the shade. You might also use a medical examination light if this is a part of your first aid kit.

Then, place one finger in front of the injured person's eyes and inform the person to only move his eyes (not the whole head), while following your finger. Move your finger left and right and up and down and look at his/her eye movement; it should be smooth and identical.

If the injury was dive-related, feel the front of the neck for air bubbles and a crackling sound coming from underneath the skin. This would indicate subcutaneous emphysema which is caused by air bubbles escaping from the lungs and chest cavity. This can be an indication of other trauma and injury to the lungs caused by lung overexpansion.

Next, scan the patient's collarbone for injuries or discoloration. Press your fingers along each collarbone individually to check for movement or reaction to your examination. You'll want to check each side separately (this applies also for the other parts of the body) because if you check both sides at the same time you won't know which side is affected

Check the shoulders by pressing them with your hand.

If possible you should also check the shoulder blades. Try to get you hands under the shoulder blades, without moving the injured person in order to determine if the shoulder blades are okay.

Moving down, re-examine the chest. Place hands on either side of the rib cage and ask the patient to take a deep breath or push the rib cage inwards (gently).

Fig 10: Check the chest for signs of pain or injury

Fig 10a - 10b: Examine the legs

Fig 11: Ask him to squeeze your finger

You should note any open wounds. If you see bubbling, you will need to apply direct pressure to the wound to stop air from moving in and out.

Try to get your hands under the injured person to reach the back and spinal column. Try not to move the patient and check the spine for deformation, as far as possible.

Divide the abdomen into four quadrants. Press on each quadrant in turn to check for any areas that are sensitive, stiff, hard or painful.

Next, place a hand on either side of the patient's pelvis and push in and down. Press down as as if you were pressing the patient's pelvis into the ground. Note any instability or painful response.

Then, examine the arms and legs, pushing hard enough to feel the bones beneath the skin and muscle. Avoid moving the whole arm or leg while doing this.

Finally, immobilise the arms and legs by holding the patient at the wrist and ankle and ask the patient to wiggle his fingers and toes. Also have him/her squeeze your finger with left and right hand and push against your hand with the sole of his/her feet.

As part of your information gathering, you should also record the patient's pulse rate and breathing rate.

Attention: Stop the assessment if the injured person complains of pain in the head, neck or back. Stabilise head and neck until EMS arrival. The use of a cervical collar, if present, is recommended in order to help with the stabilisation of the neck and head.

NOTES

Suspect head injury and activate EMS if:

- High impact trauma (i.e. car accident)
- Fall from higher than standing height
- Injured person is drowsy, sleepy, agitated or unconscious
- Doesn't remember what happened
- Has severe or persistent headache, nausea and vomiting, irritability or altered behavior, seizure

Suspect spinal injury and activate EMS if:

- High impact trauma (i.e. car accident)
- Fall from higher than standing height
- Injured person is drowsy, sleepy, agitated or unconscious
- Doesn't remember what happened
- Complains about numbness and tingling
- Is not complaining about serious injuries of the lower body or legs that would normally be expected to be painful
- Has pain or tenderness in the neck or back

First Aid Skill: Injury assessment


2.1


2.2


2.3

- Explain to the person what you are doing
- Evaluate visually and physically the injured person, starting from the head and working towards the toes.
- Compress gently
- Do not have the person to move his head/neck
- Start feeling at the head for deformities
  - Note any reaction to your touch.
- Shade his eyes from the sun or lights.
  - Determine if they dilate in response to the shade.
- Scan the patient's face (forehead, nose, cheeks ,chin) with your finger tips. *(Fig. 2.1)*
  - Determine if there are any broken bones underneath the skin.
  - Check the patient's nostrils for blood or discharge.
    - Scan the patient's ears for blood or any fluid. *(Fig. 2.2)*
- Position your hands on the patient's neck.
  - Try to understand the mechanism of injury to know if a head or neck injury is likely.
  - If the injury was dive-related:
    - Feel the front of the neck for air bubbles and a crackling sound coming from underneath the skin.
- Scan the patient's collarbone for injuries or discoloration.
- Examine each collarbone individually to check for movement or reaction to your examination.
- Check the shoulders by pressing them inwards *(Fig. 2.3)*
- Place your hands under the shoulder blades without moving the injured person and feel for abnormalities.


2.4


2.5


2.6

- Re-examine the chest.
  - Place hands on either side of the rib cage and ask the patient to take a deep breath. *(Fig. 2.4)*
  - Note any open wounds.
  - If you see bubbling, apply direct pressure to the wound to stop air from moving in and out.
- Divide the abdomen into four quadrants.
- Press on each quadrant in turn
- Check for any areas that are sensitive, stiff, hard or painful. *(Fig. 2.5)*
- Place a hand on either side of the patient's pelvis and push in and down. *(Fig. 2.6)*
- Note any instability or painful response.
- Examine the arms and legs, pushing hard enough to feel the bones beneath the skin and muscle.
- Avoid moving the extremity
- Immobilise the arms and legs by holding the patient at the wrist and ankle and ask the patient to wiggle his fingers and toes.
- Have him/her squeeze your finger with left and right hand
- Have him/her push against your hand with the sole of his/her feet.
- Try to get your hands under the injured person to reach the back and spinal column. Try not to move the patient and check the spine for deformation.

Note:

Stop the assessment if the injured person complains of pain in the head, neck or back. Stabilise head and neck until EMS arrival.

SECTION 2

REVIEW QUESTIONS
(Multiple answers possible)

1. **An injury assessment is an assessment of the injured person's entire body after an accident. During this assessment the rescuer examines the body and looks for abnormalities and/or pain.**
   a) True
   b) False

2. **An injury assessment does not include:**
   a) Getting the vital signs
   b) Head to toe assessment
   c) Inspecting the back
   d) Moving the head up and down and sidewards to check if all is OK

3. **If the injured person complains of pain in the head, neck or back you should:**
   a) Push the area that hurts in order to check the degree of pain
   b) Write down your findings and continue with the assessment
   c) Stop the assessment and stabilise the neck and head.

Review answers can be found at the end of the book

Illness Assessment

What is an illness assessment? 3.1

In a medical emergency, you'll want to determine exactly what the patient's complaints are and when they present themselves. Again, you should capture information about past medical history or other medical conditions.

There are many conditions that can indicate a variety of illnesses, including, but not limited to:

- Breathing difficulties
- Chest pain
- Severe abdominal pain
- Altered level of consciousness
- Allergic reactions
- Diabetic emergencies
- Poisoning

Fig 12: A symptom of illness can be a persistent or recurring pain or pressure in the center of the chest

3.2 How to perform an illness assessment?

Next to getting the vital signs, which are always important, you need to take a history.

To help you remember what information to gather when taking a history or performing an illness assessment, you can use the acronym, SAMPLE.

SAMPLE stands for

- **S**igns/symptoms**:** Check and ask for signs and symptoms
- **A**llergies: Ask about allergies
- **M**edications: Does the ill person use medication
- **P**ast pertinent medical history: Are there any pre-existing medical conditions?
- **L**ast oral intake: When did the ill person have his last meal or when was his last oral intake?
- **E**vents leading up to the current situation: What happened before he got ill?

Your goal should be focused on assessing the situation and starting the appropriate techniques to assure that the patient breathing.

1. Render initial care in accordance with the Injury Assessment
2. or recognize breathing problem
3. Place the injured person in the most comfortable position.
4. Call EMS if necessary

First Aid Skill: Illness assessment


3.1


3.2


3.3

- Remember your own protection.
- Make sure you have a pen and paper to record your findings. *(Fig. 3.1)*
- Interview the patient to determine where he might have problems or feel discomfort. Focus on these areas.

Use the acronym, **SAMPLE**.

Signs/symptoms

- Ask the ill person how/what he feels, when his condition started and if the condition is worsening or improving.
- Get vital signs / pulse and breathing rates
  - Count both for 30 seconds and multiply by two. *(Fig. 3.2)*
  - Normal pulse rates are between 60 and 100 beats per minute
  - Normal respiration rates are 12 to 20 breaths per minute.
- Check skin colour, temperature and presence of perspiration (sweat)
- If you have been trained to do so, it is also helpful to determine the injured patient's blood pressure. *(Fig. 3.3)*

Allergies

- Ask the person if he is allergic to something and if he may have been in contact with anything which could have triggered this allergy.


3.4

Medications

- Ask if the ill person is taking medication
  - Type of medication and name
  - When he/she took it
  - How much was taken
  - Why he/she takes it

Past pertinent medical history

- Get information about past medical history or other medical conditions.
  - Are there any pre-existing illnesses or medical conditions like diabetes, asthma or heart conditions?
  - Does he/she take medications (if not mentioned yet) or is he/she treated for the existing medical conditions? *(Fig. 3.4)*

Last oral intake

- Ask when the last time was that the person had a meal or drank something (including alcohol)
- Ask if he/she uses any kinds of drugs

Events leading up to the current situation.

- Record a history of the events leading up to the situation.
  - If it was a traumatic event, determine what brought on the situation and determine the mechanism of injury.
    - Record any medical issues that may complicate providing care or previous injuries to the same area that may confuse your findings.
  - In a medical emergency, you'll want to determine exactly what the patient's complaints are and when they present themselves.

SECTION 3

REVIEW QUESTIONS
(Multiple answers possible)

1. **The A in SAMPLE stands for:**
   a) Allergies
   b) Asthma
   c) Anxiety
   d) Aneurism

2. **It is not important to know if there where any pre-existing medical conditions:**
   a) True
   b) False

Review answers can be found at the end of the book

DAN Training

Automated External Defibrillation course (AED)

Sudden Cardiac Arrest is responsible for thousands of deaths each year.
Providing CPR delays the inevitable by helping to oxygenate blood and keep it circulating throughout the body, CPR cannot reset the heart rhythm and make it beating again.
Only Defibrillation can do that.

Every minute defibrillation is delayed, the chance of survival drops by 7 to 10 percent.
The **DAN AED course** teaches you how to provide care with an AED, making your role as rescuer crucial in the chain of survival.

This four hour course can make the difference between life and death.

Ask your instructor how to **become a DAN AED Provider** or visit our website at **www.daneurope.org**

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Medical Emergencies

Kind of Medical Emergencies 4.1

Breathing difficulties 4.1.1

Many medical conditions can cause breathing difficulties.
As First Aid provider you should try to understand what caused the breathing problem and how to react to it.

In general when encountering breathing difficulties you should:

- Activate EMS
- Place the injured person in the most comfortable position for breathing, like sitting in a chair or leaning forward (semi erect position)
- Loosen tight clothing around the neck and chest area
- Reassure the injured person
- Encourage him to breath evenly
- Administer oxygen (if present and trained in it)

Hyperventilation 4.1.2

A type of breathing problem is hyperventilation, which can be caused by anxiety or panic. Hyperventilation can also be brought about voluntarily, by taking many deep breaths. Hyperventilation can also occur as a consequence of various lung diseases, head injury, or stroke.

Fig 13:
Too rapid and shallow breathing can cause hyperventilation

During normal breathing oxygen is provided to the body's tissues and carbon dioxide is removed, but when hyperventilation occurs a person breaths faster and deeper than necessary and the level of carbon dioxide decreases. If carbon dioxide levels are high, the body assumes that oxygen levels are low, and accordingly, the brain's blood vessels dilate to assure sufficient blood flow and supply of oxygen. Conversely, low carbon dioxide levels (e.g. from hyperventilation) cause the brain's blood vessels to constrict, resulting in reduced blood flow to the brain.

Signs and symptoms of hyperventilation include:

- Anxiety, panic
- Deep, rapid breathing, panting
- Light-headedness, headache

- Weakness, dizziness
- Trembling or tingling hands, feet and/or mouth
- Confusion
- Sometimes fainting

When hyperventilation occurs it is important to reassure the injured person (and remove the cause of anxiety) and have him breath in and out from a paper bag in order to increase the carbon dioxide level until the breathing is under control.

4.1.3 Asthma

Another kind of breathing difficulty is Asthma, a lung disease.

Asthma attacks are usually occasional and happen at irregular times, but between these episodes there is little or no sign of a breathing difficulty. The attacks themselves happen when the lower airways become irritated and have a bronchospasm, which is a reversible narrowing of the bronchioles, the smallest pathways throughout the lungs.

Signs and symptoms include:

- Breathing problems, wheezing
- Use of neck and chest muscles for breathing
- Long, laboured exhalations
- Restlessness and anxiety
- Fast heart rhythm
- Person is normally in sitting position, leaning forward with the hands on knees or table *(Fig. 14)*

People who know they have the occasional asthma attack frequently carry their own metered dose inhaler that usually provides rapid relief to the symptoms. However, when an asthmatic has a prolonged attack with severe symptoms, this is a life-threatening situation.

When this happens, you should establish and maintain an airway, deliver oxygen and begin supporting breathing using positive pressure ventilation with supplemental oxygen if he is not breathing adequately. You should also attempt to calm the person and reduce his breathing workload and oxygen consumption.

Fig 14:
Signs of asthma

Other actions can be:

- Help the asthma patient use his inhalator
- Put him in a comfortable position
- Loosen clothing around neck and chest
- Alert the emergency services for serious asthma attacks
- Monitor vital functions if necessary

Heart attack

4.1.4

Any time there is a blockage in the blood supply to the heart muscle itself, a person is having what is commonly termed a heart attack. If the heart attack were to become severe enough to cause the heart to stop functioning, your role as a first aid provider would be to initiate CPR and defibrillation, but when the person is suffering from a heart attack but is still conscious and breathing, your role is more supportive.

Fig 15:
Pain in the centre of the chest is a common symptom of a heart attack

Common signs and symptoms:

- Often pale colour (face)
- Sweating
- Short of breath
- Pain starts in the centre of the chest and can radiate out

In this situation, you would want to administer oxygen first aid, attempt to calm the person and reduce his anxiety. You'll also want to place him in a position that is comfortable for him. Some people who have a history of heart problems will carry their own prescription of nitroglycerin. You can assist them in taking their own prescription, but do not attempt to give nitroglycerin or any other medication to a person who doesn't have their own prescription.

Other First Aid actions are:

- Avoid exertion
- Loosen clothing around the neck and torso
- Reassure the injured person and treat for shock
- Administer oxygen
- Continue to monitor vital signs

Not all heart attacks are painful, and there are many different variables to look for when it comes to heart conditions. These basic signs and symptoms are discussed as possible warning signs in the DAN AED program.

Heart disease is a common problem in the modern society. In many occasions modern life style contributes to heart disease. Contributing factors for a heart disease include:

- Lack of exercise
- smoking
- obesity
- family history
- stress
- hypertension (high blood pressure)
- diet high in fat

4.1.5 Severe abdominal pain

Severe abdominal pain shouldn't be ignored and can indicate a serious problem.

There can however be several causes for this pain, which in many cases are not clear. An inflammation, obstruction, vascular problem, digestive problem, mechanical problem, Endocrinological (menstruation) problem, pregnancy problem, trauma or muscle strain or muscular infection are some of the possible causes.

As first aid provider you are limited in what can be done, but you should:

- Activate EMS
- Place the person in the most comfortable position (probably on the floor with legs bended at the knees)
- Check and reassure the injured person
- Continue care until EMS arrival

4.1.6 Altered level of consciousness

An altered level of consciousness can result from a variety of factors.

These factors include:

- insufficient oxygen or blood flow to the brain - hypoxia
- excessive pressure within the skull (as result from a trauma for example)
- diabetes
- exposure to poisons
- dehydration
- exposure to drugs or alcohol
- hypothermia
- hyperthermia
- stroke
- infection of the central nervous system

Actions to be taken by the First Aid provider:

- Activate EMS as soon as the problem is recognised

Fig 16:
Abdominal emergencies can indicate a serious problem

- Make sure the patient can not injure himself
- Protect against falling
- Protect against seizures
- Place in recovery position if necessary

4.1.7 Allergic reaction

Every year many people have allergic reactions.

Mostly these reactions are mild (for example in the case of hay fever) but in severe cases allergic reactions are life threatening (this is called anaphylaxis).

Allergic reactions differ from person to person, and people who are aware of having allergic reactions to, for example, shellfish or bee stings, might carry medication, that can be used in an emergency.

During the allergic reaction the injured person can show:

- Anxiety
- Rash
- Swollen face, lips, tongue, neck, hands and/or feet
- Difficulty breathing, wheezing, sneezing or coughing
- Dizziness
- Burning or itching skin

Severe reaction can occur rapidly and a swift intervention of a first aid provider is needed.

Fig 17:
Allergic reaction can be life threatening

First Aid actions are:

- Alert EMS
- Keep the person as calm as possible
- Place in a comfortable, sitting position
- If trained to do so administer oxygen (100%)
- If available help the sick person to take his own medication
- Report to the emergency services what kind of anti allergy medication was taken

Diabetic emergencies 4.1.8

Diabetes is a condition in which our body is not able to regulate the glucose (sugar) in the blood. The responsible organ of this condition is the pancreas which is unable to produce enough insulin to help transport blood-sugar to the cells where it is used to produce energy (needed to function normally).

When the cells work harder, they are in need of more glucose and if they are in rest they need less glucose.

If the level of glucose in the blood become to high or too low, normal brain function can be affected, leading to an emergency.

Hypoglycaemia is when the level of sugar in teh blood is too low (this can lead to an insulin shock). Hyperglycaemia is when the level of sugar is too high (this can lead to a diabetic coma).

Often people who have diabetes will wear a medical alert tag (not used in every country) to indicate to rescuers what the problem may be. Barring that indication, they may also carry medications such as insulin or glucose that will provide a clue.

When a person is a diabetic or is having a diabetic emergency, they will often exhibit an altered mental status, appearing to be intoxicated. This may include staggering or slurred speech and range to complete unconsciousness.

Other signs and symptoms:

Low blood sugar level - Hypoglycaemia

- Pale, clammy skin
- Rapid and strong pulse
- Trembling
- Feeling hungry

- Sweating
- Abnormal behaviour (including agression)
- Anxiety, confusion, disorientation, nervousness
- Nausea, dizziness, fatigue
- Blurry vision (seeing "spots")
- Seemingly drunk
- Difficulty speaking

High blood sugar level - Hyperglycaemia

- Flushed, dry and warm skin
- Weak and rapid pulse
- Increased thirst, dry mouth
- Increased urination
- Fatigue
- Dizziness, nausea
- Blurry vision
- Vomiting
- Shortness of breath
- Deep, fast breathing
- Acrid breath
- Possible loss of consciousness

When you confirm that there is altered mental status and the person has a history of diabetes, controlled by medication, your first step is to establish and maintain an open airway. If the person's mental status is severely altered, you may need to clear the airway of vomit. You should also provide oxygen first aid.

If the person is alert enough to swallow, administer oral glucose, placing the gel between the cheek and gum. If he is not alert enough to swallow, do not give the glucose as the sticky material will block his airway.

Altered mental status with a history of diabetes can quickly lead to a serious medical emergency. You should get the person to advanced medical care as quickly as possible.

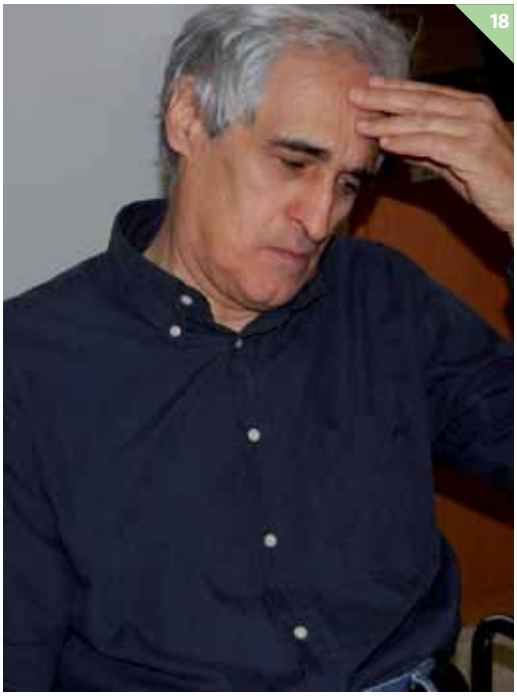

Fig 18:
Signs of Hypoglycaemia : Anxiety, confusion, disorientation

First Aid actions:

- Maintain ABCs
- In case of Hypoglycaemia, rapidly administer one of the following sources of glucose: 3 - 6 glucose tablets, a glass of soft drink (not diet or light), sweets (with sugar) or 3 - 5 sugar cubes
  - Only if the injured person can swallow
  - Do not be afraid of administering too much sugar
  - Administer more sugar if symptoms persist after 15 minutes
  - Alert emergency service if symptoms do not disappear or worsen

- In case of Hyperglycaemia
  - Ask the injured person to follow his doctor's advice regarding his hyperglycaemia problem (insulin injection)
  - Alert emergency service if symptoms do not disappear or worsen

Note:
In case of doubt of high or low level of sugar in the blood administer sugar (give something to eat or drink)

Poisoning

4.1.9

There are numerous poisonings that can affect the human body, including alcohol and the use of drugs.

Poisons may enter the body in the following ways:

- Ingestion by swallowing of solids or liquids
- Inhalation of gases, fumes or mists
- Absorption due to contact with the skin
  - or by bites or stings
  - or by injection into the body with syringes
  - or by contact with the skin or mucous membranes

Fig 19:
Poisons can cause decreased mental status

Some of the common signs of poisoning include:

- Nausea/vomiting
- Headache
- Abdominal pain
- Altered mental status
- Seizures
- Irregular heart rate
- Abnormal blood pressure — high or low
- Dilation or constriction of pupils
- Shortness of breath
- Injury to skin (like burn marks round mouth and lips or blisters)
- Diarrhea
- Sweating
- Ringing ears
- Cherry red lips in case of CO poisoning (late symptom)

Any time you believe a patient has been poisoned, there are several steps that you will need to take.

The first step in any poisoning situation, regardless of how the poison was delivered, you should work to maintain an open airway. Regardless of what else you do, if airway and ventilations aren't ensured, the person will die.

Poisons can cause decreased mental status in which the patient is unable to maintain his airway. Many poisons can cause vomiting. Also, poisons frequently cause vomiting or secretions that can block the airway or be aspirated into the lungs. Unless other injuries prevent it, keep the patient in the recovery position and be prepared to suction the airway if necessary.

Deliver oxygen and be prepared to assist with breathing or ventilations. If the person is breathing on his own, use a non-rebreather mask.

If you need to assist with breathing, use a DAN mask with supplemental oxygen or other ventilation device such as the Bag-Valve Mask.

The Bag-Valve Mask is not included as part of this program but is taught as part of the DAN Advanced Oxygen First Aid for Scuba Diving Injuries course.

Activated charcoal can sometimes help bind poisons that have been swallowed or ingested, but it should be used only by trained providers under the direction of a physician.

When you believe someone has been poisoned, you will need to bring the substance to the medical facility if possible. If not, attempt to find out the name, chemical composition or list of ingredients and bring that to the hospital.

Depending on the ingested poison it could be important to induce vomiting, but this must be confirmed by the poison centre or physician.

If a poison is a liquid, irrigate all effected parts of the body with water for 20 minutes.

All poisoned patients need to see a physician, even if it appears that all signs of a problem have been controlled and the emergency is over.

Other First aid procedures are:

Swallowed poison

- Try to determine what and how much poison has been swallowed
- Find out age and weight of the injured person
- Only if acid of alkaline substances have been swallowed give water to drink to dilute the product (when advised by medical personnel)
- Contact emergency services or poison centre
- Do not induce vomiting unless asked to do so by the emergency service or poison centre
- Position injured person on his left side
- Keep bottles or medication for the emergency services
- Do not administer anything (milk, activated charcoal, Ipecac syrup) unless told to do so by poison centre or emergency service

Inhaled poison

- Remember your own safety – protect yourself
- Remove the injured person from the contaminated space and move him to a space with fresh air
- Check vital functions and start BLS
- Administer oxygen
- Contact poison centre – emergency services
- Carbonmonoxide poisoning has to be treated in a hyperbaric facility as soon as possible (happens in winter if there is poor combustion/ventilation of heating apparatus - stoves)

Absorbed poison (skin contact)

- Flush abundantly with water and soap
- Remove contaminated clothes
- Contact poison centre
  - Consult the company library for specific poison info for products used in the company
- Immersion in cold water of applying cold compresses may relieve itching
- A hot bath/shower may temporarily cause a nasty itch but may eventually lead to less itching
- Activate the emergency services for serious cases

Other medical Emergencies 4.2

Stroke 4.2.1

A stroke or "brain attack" is a sudden interruption in blood flow to the brain resulting in neurological deficit. It affects many people each year, is the 3rd leading cause of death and is the leading cause of adult disability.

With new treatment options available, First Aid personnel should alert EMS as quickly as possible whenever a potential stroke patient is identified.

The most common causes of a stroke are:

- Cerebral thrombosis (a blood clot obstructing the artery).
- Cerebral embolism (a mass or air bubble obstructing the artery).
- Cerebral haemorrhage (ruptured artery / ruptured aneurysm).
- Cerebral Atherosclerosis (a degenerative disease of the arteries associated with fatty deposits on the inner walls, leading to reduced blood flow)

Risk factors that increase the likelihood of stroke are:

- Hypertension
- Atherosclerosis / coronary artery disease
- Atrial fibrillation
- Hyperlipidemia
- Diabetes
- Vasculitis
- Lupus

If a person exhibits a loss of mental function, including the ability to speak, when there is no sign of a traumatic head injury, you should immediately suspect that the person has had a stroke.

While there are a large number of signs and symptoms for people having a stroke, some of the possible indications include:

- Altered mental status ranging from dizziness or confusion to complete unresponsiveness
- Paralysis or weakness to the face, arm, and leg on one side of the body
- Speech disturbances, including slurred, garbled or incomprehensible speech to complete loss of speech
- Loss of control of the bladder or bowel
- Unequal pupils
- Loss of vision in one eye
- Double vision or other visual disturbances
- Eyes turned away from the affected side of the body
- Nausea and vomiting
- Severe headache
- Seizure activity
- Stiff neck
- Difficulty in coordinating muscular movements

Your first priority again is to maintain an open airway. You will need to monitor this carefully as the airway may deteriorate with time. You will probably also need to suction or remove vomit from the person's mouth. You should also deliver oxygen first aid and may need to assist with ventilations if the person isn't breathing adequately.

To further protect the airway, position the person in the recovery position, as long as he is breathing on his own. You should also protect any paralysed extremities and get the person to emergency medical care.

Seizures / convulsions 4.2.2

Another possible medical condition first aid providers encounter is a seizure. A seizure is a sudden and temporary alteration in behavior caused by a massive electrical discharge in a group of nerve cells in the brain.

Seizures can range in behavior anywhere from a brief, trance-like state to the jerky muscle spasms known as a convulsion. A common cause of seizures is epilepsy.

The most common type of epileptic seizure is the tonic-clonic seizure, more commonly called a grand-mal seizure. The person may cry out, fall to the ground, arch his back and become rigid, then enter a period of uncontrolled muscle spasms.

Immediately following a seizure, most people will be in a postictal state. This is a recovery period for the body. The person will be unresponsive, extremely sleepy, weak and disoriented. They can also be combative. The physical work of the seizure will make the person extremely tired. This phase may last up to 30 minutes.

As a first aid provider, there isn't much you can do for a person who is having a seizure, nor is there much you need to do. Your first priority should be to move anything away from the person that he may strike and injure himself during the spasm period. Protect him and keep him safe, but do not attempt to restrain him. You should also avoid placing anything in the person's mouth while he is seizing. Keep hands and fingers away, and do not attempt to open the mouth with a stick or a gag.

Once the person has stopped actively convulsing, your priority is to conduct your initial assessment and ensure an open airway. You should also provide oxygen first aid and support breathing as necessary.

There are many conditions beyond epilepsy that can cause a person to have a seizure. Once the seizure is over and you have time to take a patient history, you should establish whether the person has a history of a seizure disorder. If not, you should attempt to determine any other conditions that may cause the seizure. This information will be useful for the emergency medical services.

Other conditions that can cause seizures include:

- High fevers — this usually happens in children
- Infections, including meningitis or encephalitis
- Poisoning, including drugs or heavy metals, and oxygen
- Hypoglycemia
- Head trauma
- Shock
- Hypoxia/hyperoxia
- Drug or alcohol overdose or withdrawal
- High blood pressure
- Intracerebral bleed and
- Pregnancy or complications from pregnancy

Always alert EMS if:

- Serious injuries have been sustained during the episode or if there are any life threatening signs
- The injured/sick person is unconsciousness after the episode
- The injured person never had an episode before
- The episode lasted more than 10 minutes
- The injured person is a pregnant woman

4.2.3 Epilepsy

Is a neurological disorder caused by abnormal, excessive or synchronous neuronal activity in the brain.

The first aid is the same as for seizures (see seizures / convulsions)

4.2.4 Alcohol or drugs intoxication

This is a "modern" illness. Many people are using alcohol or drugs which can causes problems that can lead to a medical emergency.

Signs and symptoms are:

- Specific odour of the breath
- Hallucinations
- Nausea, queasiness, headache
- Dilated or small pupils
- Reduced responsiveness, drowsiness
- Unconsciousness, respiratory problems
- Nervous, irrational or aggressive behaviour
- Loss of memory, confusion, disorientation
- Movement not coordinated

First Aid Care should be directed to keeping in control of the situation and monitoring the injured person whom might not be reasonable and can have violent reaction.

Other actions are:

- Remember your own safety
- Call police or emergency service in case of aggressive behaviour
- Recovery position and BLS if necessary
- Alert emergency services for serious cases
- Try to determine what and how much drugs have been taken in case of an overdose
- The poison centre can be called if the symptoms are minimal
- Remove the person from all sources of alcohol.
- Prevent the intoxicated person from falling and keep him/her away from dangerous objects
- Keep the intoxicated person from driving vehicles.
- Find out if only alcoholic beverages has been ingested. Determine if the person has taken any medications or illegal drugs.

Fig 20:
When determining if someone is intoxicated it is necessary to observe his behaviour

SECTION 4

REVIEW QUESTIONS
(Multiple answers possible)

1. **When encountering breathing difficulties you should:**
   a) Place the injured person in the most comfortable position for breathing, like sitting in a chair or leaning forward (semi erect position)
   b) Loosen tight clothing around the neck and chest area
   c) Reassure the injured person
   d) Administer oxygen (if present and trained in it)

2. **Signs and symptoms of hyperventilation include:**
   a) Anxiety, rapid breathing
   b) Use of neck and chest muscles for breathing
   c) Slow breathing
   d) Pain in the centre of the chest

3. **Have a person with hyperventilation breathe in and out from a paper bag:**
   a) Until the breathing is under control
   b) For at least 10 minutes

4. **Signs and symptoms of asthma include:**
   a) Uncontrolled eye movement
   b) Use of neck and chest muscles for breathing
   c) Long laboured exhalations
   d) Rash

5. **First aid procedures for Asthma include:**
   a) Have the victim use his inhalator
   b) Put sick person in a comfortable position
   c) Loose clothing around neck

Review answers can be found at the end of the book

?

6. Signs and symptoms of a heart attack include:

a) Red face
b) Use of neck and chest muscles for breathing
c) Pain in the centre of the chest that can radiate out

7. First Aid for a heart attack include:

a) Reduce Anxiety
b) Place injured person in a comfortable position
c) Administer oxygen if trained
d) Help them administering own medication
e) Loose clothing around neck and torso

8. When a person suffers from severe abdominal pain, you should:

a) Place the person in the most comfortable position and reassure him/her
b) Give sugar
c) Encourage the person to go to the toilet
d) Non of the above

9. First aid action in case of altered level of consciousness include:

a) Protect injured person from falling
b) Protect him/her against seizures
c) Activate EMS
d) Place in recovery position if needed

10. Signs and symptoms of an allergic reaction include:

a) Anxiety
b) Rash
c) Swollen face, lips, tongue, neck, hands and/or feet
d) Difficulty breathing, wheezing, sneezing or coughing

Review answers can be found at the end of the book

?

11. In case of an allergic reacton and if available help the sick person to take his own medication:

a) True
b) False

12. Which of the following are possible signs and symptoms of a diabetic emergency:

a) Pale, clammy skin
b) Flushed, dry and warm skin
c) Rapid and strong pulse
d) Weak and rapid pulse
e) Feeling hungry
f) Sweating

13. First aid actions for hypoglycaemia might include administration of insuline:

a) True
b) False

14. Common signs and symptoms of Poisoning include:

a) Altered mental status
b) Irregular heart beat
c) Shortness of breath
d) Abdominal pain

15. The first step in any poisoning situation, regardless of how the poison was delivered, is to maintain an open airway:

a) True
b) False

Review answers can be found at the end of the book

?

16. Signs and symptoms of a stroke include:

a) Speech disturbances
b) Paralysis or weakness to the face
c) Unequal pupils
d) Feeling hungry
e) Severe headache

17. Never administer oxygen to victims of a stroke:

a) True
b) False

18. You should try to restrain persons with convulsions:

a) True
b) False

19. Signs and symptoms of an alcohol or drug intoxication include:

a) Hallucinations
b) Reduced responsiveness
c) Irrational behaviour
d) Dilated or small pupils
e) Swollen face, lips, tongue, neck, hands and/or feet

20. First Aid for alcohol and drug intoxication should be directed to keeping in control of the situation and monitoring the injured person whom might not be reasonable and can have violent reaction:

a) True
b) False

Review answers can be found at the end of the book

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Bandaging and wound management

5.1 Bandaging - general

Any time you have an open wound, when the skin has been broken, you will need to apply a dressing and a bandage. Of course you should always protect yourself, ensure the airway and breathing and control the bleeding from the wound first.

Pic 21:
Open wound

There are no rules to proper bandaging. Depending on the situation and the materials on hand, you will probably have to be creative and adaptable. Your first priority is to cover a wound to protect it from further injury and to stop bleeding. You should use whatever materials you have on hand and adapt your methods to the situation, as long as you meet some basic recommendations.

A dressing is the material you use to cover a wound. Dressings should be as clean as possible and sterile if at all possible. Keep dressings free from debris or dirt as you prepare them. Keep the wound as clean as possible, wipe away any dirt from the wound, but don't attempt pick material from the wound itself (unless the wound is superficial). You can irrigate wounds with cold, clean and running water in order to remove dirt or small debris.

Don't bandage dressings in place until the bleeding has stopped. The only time this isn't true is when you are using a pressure dressing to stop the bleeding. However, bleeding can normally be controlled by elevation of the wound and direct pressure, so you will rarely need to use a pressure bandage for bleeding.

If the injury includes an impaled object, you should leave the item in place. Secure it with dressings and bandages and then transport the patient to advanced medical care.

The only time you would want to remove an impaled object from a wound is when the object is penetrating through the cheek. In this case pull it out and dress the wound on the inside and outside.

When you are dealing with an abdominal injury in which internal organs are exposed or sticking out, don't touch the organs or attempt to reposition them. Simply cover them with a bandage and protect the patient from further harm. You can also flex the patient's knees and hips to relieve tension on the abdomen, assuming you don't suspect spinal injury.

The dressing material you use should completely cover the wound. When you apply a bandage to the wound, you should tape them in place to make sure there aren't any loose ends that could catch on an edge.

Pic. 22: Controlling bleeding including direct pressure, elevation and the use of a dressings.

When you are applying the bandage, begin wrapping from the farthest point away and move toward the heart.

The only time this isn't true is when you are applying a pressure bandage for an envenomation. In that case, you would bandage away from the heart.

If possible, you should remove all jewellery on the appendage as it can cause problems should the injury cause swelling.

Bandage the wound securely so the dressing isn't able to slip and shift. However, be careful not to interfere with circulation to any extremity beyond the wound. You will need to monitor the pulse and motor function beyond the bandage before and after you apply the bandage.

When you are covering a small wound, don't simply cover the wound itself with the bandage, spread out the bandage for several inches on either side of the wound to equalize pressure.

If you are applying a bandage across a joint, bandage the joint in a comfortable position, one in which it will remain. Don't try to move a joint after you apply the bandage.

Eye injury 5.2

With eye injuries, bandage both eyes together as the movement of the uninjured eye can cause problems with the injured one.

Also in this case, do not remove any embedded object. You can use a plastic cup to place over the embedded object when covering the eye to avoid pressure on the object and/or eye.

In case of a blow to the eye you can place a " Cold Pack " over the eye but without applying pressure on the eye itself. The use of a cold pack might reduce swelling and pain.

Keep the person also from rubbing his injured eye. If dust, irritants or small particles are in the eye, you can use water to gently flush the eye. In this case ask the injured person to bend his head (sidewards) in such a way that the injured eye is lower than the nose. Pour the water in the injured eye (keeping the eye open) starting in the corner of the eye closest to the nose. Water will follow gravity, flushing the eye out. Do not flush the eye in the highest position as gravity will take the dust, irritant or particles to the lower healthy eye.

Pic. 23:
Do not allow the injured person to rub the eyes

In case of splashes from chemicals, acids or cleaning products you should rinse the eye for 10-15 minutes. The eye should be kept open and it is recommended to have the injured person rolling their eye in order to obtain the best results.

While for small wounds it is not always necessary to alert EMS, it is however important to contact EMS immediately if:

- An object is embedded in the wound
- You can't control bleeding
- An abrasion is bigger than half the width of the palm of the injured person
- Bone, muscle or other subcutaneous tissue is exposed
- A wound involves the face, eyes, or genital area
- A wound can't be cleaned properly
- A wound is caused by a bite

5.2 Tourniquet

Managing serious external bleeding requires the responder to act as quickly as possible; the responder can, in the presence of a trauma victim breathing normally, give priority to the steps to stop the bleeding.

Pic. 24:
A tourniquet can be defined as a tightly encircling bandage of such size and resistance to be able to stop hemorrhagic bleeding.

To control the bleeding, it is necessary to apply direct pressure to the wound, and if needed, manage the episode with a compression bandage, and the help of hemostatic agents in the form of dressings.
If the above-mentioned procedures do not result in controlling the bleeding, and the wound involves a limb, it is possible to proceed by using a tourniquet.

A tourniquet can be defined as a tightly encircling bandage of such size (width > 4cm) and resistance to be able to stop hemorrhagic bleeding *(Pic. 24)*. It should not be confused with latex tourniquets or strap and buckle tourniquets, which are normally used exclusively by medical personnel as aid for venous access!

Using the latter for managing serious external bleeding is not only advised against, but also counter-productive (reduction of the venous return and increase of hemorrhagic bleeding). A commercial tourniquet is a very effective device, fast, safe, and easy to use. On the market, there are at least 3 kinds of tourniquets that have passed numerous tests and years of field trials in order to obtain approval from the medical community at large. In any case, a tourniquet must be at least 4cm wide, manufactured with resistant materials and equipped with a tightening device. The width of the device is inversely proportional to the pressure that will be necessary to stop the bleeding.

A tourniquet has been designed to be used both by a responder and by the injured person: it is in fact possible to apply it also using a single free hand.

Historically considered a "dangerous" device for saving the limb on which it was applied, it was banned for many years by prehospital rescue services.The last twenty years of data, though, gathered especially in modern war zones, have shown with satisfactory certainty that using this device can be considered safe, and most of all lifesaving.

A tourniquet must be applied close to the wound, above it towards the trunk of the victim, avoiding the joints, directly on the skin (at least 5-8 cm above the wound). In case that the wound site is not immediately visible or there are difficulties in exposing the wound itself, the tourniquet can also be quickly applied on the clothes of the injured person, in the highest possible position compared to the limb (making sure that there are no objects in the pockets) *(Pic. 25)*. The tourniquet should be applied as soon as possible; in particular, very high success percentages (<96%) are connected to the application of a tourniquet before the injured person finds themselves in a condition of uncompensated shock. Once it has been applied, the tourniquet must be strongly tightened using the specific lever until bleeding has stopped and distal pulse has been interrupted. If a single tourniquet is not enough to reach this result, it is possible to apply a second tourniquet directly above the first one. Once it has been applied successfully, it must not be covered by any bandage or other material, but must remain in plain sight while waiting for Emergency Medical Services. If the device is equipped with a label, it is fundamental to write on it the exact time that the tourniquet was applied; if a label is not available, it is possible to write the time of application directly on the patient (forehead or other suitable free part).

Pic. 25:
A tourniquet must be applied close to the wound.

It has been statistically proven that using a tourniquet is safe for a period up to 2 hours after it has been applied. Most likely, in a national context, it will be possible to transfer the injured person to an advanced medical care unit well before that time period has elapsed.

Between 2 and 6 hours after it has been applied, gradual damage to the limb is possible, out of the control of the responder: this possibility must nevertheless not discourage from using a tourniquet, whose goal is saving the life of a victim of serious external bleeding.

Even if in the past it was considered useful to periodically loosen a tourniquet to reduce potential damage to the limb, once it has been applied the tourniquet must never be loosened: to do so would mean only to increase the bleeding already sustained by the victim. The tourniquet must remain tight in its position until the victim arrives to an advanced medical care unit, where it will be removed using special techniques whose goal is to save the life of the injured person. It is also necessary to check periodically that the tourniquet does not need to be tightened again; in the same way, after the potential transfer of the victim, it is necessary to check the positioning of the tourniquet again.

Applying a tourniquet can be very painful for a conscious victim: reassuring them and never leaving them alone is the proper behavior that a responder must exhibit while waiting for Emergency Medical Services.

Pic. 26:
It is possible to aid a victim of serious external bleeding with an improvised TQ.

In case that a commercial tourniquet is not available, it is possible to aid the victim with an improvised tourniquet. Among readily available objects, a sphygmomanometer (device for measuring blood pressure) is definitely worth mentioning; its limitation is the potential loss of air from the system, and the fact that it is not very robust
(check often that it remains effective after the application). It is also possible to improvise a tourniquet with a strong bandage, which must be wide enough, and then tightened using a firm stick (avoid devices that are too thin or hard to tighten, such as shoe laces or belts).

Removal of the tourniquet must be carried out exclusively by medical personnel within an advanced medical care unit.

5.3 Hemostatic agents

For managing serious external bleeding it is also possible to use hemostatic agents: these products have been designed to aid the natural clotting function of the blood, and the resulting reduction of serious external bleeding that can be life-threating, especially for wounds where direct pressure alone is not effective, and a tourniquet cannot be used. Mainly, the active ingredient is divided between Chitosan-based (natural polysacharide coming from marine crustaceans) or Kaolin-based (clay mineral derivative of aluminium silicate) products.

Pic. 27:
The dressings soaked in the product, used to dab the wound from the inside.

Previously available in the form of granules, nowadays hemostatic agents are applied by utilizing dressings soaked in the product, used to dab the wound from the inside. *(Pic. 27)*.

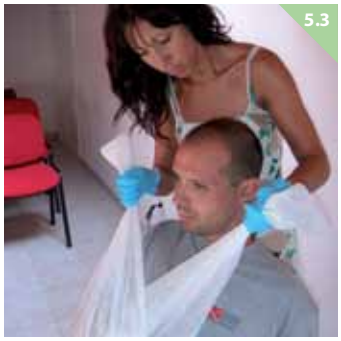
The correct use of this product calls for dabbing the wound by inserting the dressing inside the wound itself (and not simply covering it from the outside). Even if there are a few exceptions connected to some specific products, the correct positioning of hemostatic dressings, after having inserted the dressings themselves inside the wound, calls for maintaining direct pressure to the wound for at least 3 minutes.During this interval rapid blood clotting is obtained, until external bleeding has stopped. The injured person could report a burning sensation or a sensation of strong heat during the application: in fact there is no topical warming, but only a sensory effect is produced.

In case hemostatic dressings are not available, the technique of dabbing the wound (by inserting one or more normal dressings inside the wound itself), and of direct pressure to the dressing is still an effective method to stop the bleeding.

First Aid Skill:
Bandaging and wound management


5.1


5.2


5.3

- Remember SAFE
- Inspect the wound
- Rinse the wound with water if needed
- Remove all jewellery on the appendage
- Apply a clean dressing on the wound (cover the wound completely)
- Apply direct pressure to the wound *(Pic. 5.1)*

Injury on limb

- Apply a bandage to keep pressure on the wound, but be careful not to interfere with circulation and do not cover toes or fingers nails (to check circulation later)
- Monitor the pulse and motor function beyond the bandage before and after you apply the bandage. *(Pic. 5.2)*
- Start bandage from below the wound towards the heart
- Secure the end of the bandage (clip, pin, tape)
- Check circulation by pinching the nail of the bandaged limb. The pink colour under the nail will go white, but should become pink again immediately after pressure on the nail has been released.
- Use the triangular bandage to immobilise and elevate the injured limb. *(Pic. 5.3)*

Injury on a foot

- Apply a bandage on the foot, secure it by wrapping it a few times around the ankle and then work back towards the injured foot
- Secure the bandage at the foot
- Check for circulation
- Avoid using the injured foot

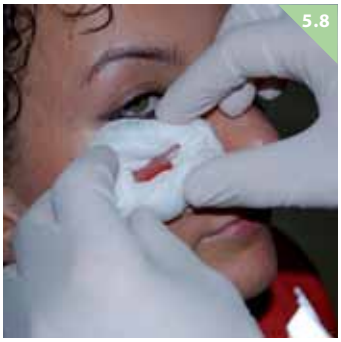
Injury on a hand

- Apply a bandage on the hand, secure it by wrapping it a few times around the thumb and wrist *(Pic. 5.4)*
- Secure the bandage
- Check for circulation *(Pic. 5.5)*

Bandaging across a joint

- Bandage in a comfortable position
- Bandage below and above the joint *(Pic. 5.6)*
- Don't try to move a joint after you apply the bandage
- Splint the injury, only if EMS help will be delayed
- Check circulation


5.7


5.8

5.9

Impaled object

Leave the object in place and secure it with the bandage to prevent movement. *(Pic. 5.7 - 5.8)*
The only exception to this is with an impaled object through the cheek

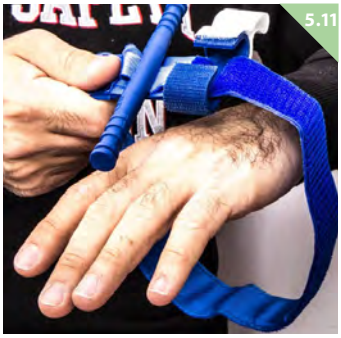
Small wounds

Bandage several inches on either side to equalize pressure.

Eye Injury

- Do not remove embedded object
- Bandage both eyes
- Use a plastic cup to place over the embedded object
- In case of a blow of the eye use a "Cold Pack" *(Pic. 5.9)*
- If dust, irritants or small particles are in the eye, you can use water to gently flush the eye.
- Keep the person also from rubbing his injured eye
- In case of splashes from chemicals, acids or cleaning products you should rinse the eye for 10-15 minutes. The eye should be kept open and it is recommended to have the injured person rolling their eye in order to obtain the best results.

First Aid Skill: Tourniquet



- Verify safety and protect yourself
- Perform ABC check of the patient, and call Emergency Medical Services when possible
- If the victim is losing blood very rapidly, and at first sight seems to be breathing normally, anticipate managing serious bleeding
- If it's not possible to manage serious bleeding to a limb with direct pressure or a compression bandage, apply a tourniquet *(Fig. 5.10)*

Applying a tourniquet to a limb

- While you prepare the tourniquet, keep direct pressure to the wound with a hand or a knee, if possible
- Apply the tourniquet close to the wound, at least 5-8 cm above it, avoiding the joints, and directly on the skin (if this is not possible, directly on the clothes as far up as possible on the limb towards the trunk of the victim, and check if there are any pockets)
- To apply a tourniquet to an upper limb, you can leave it closed in a loop and insert it from the hand, sliding it up, and then tightening it *(Fig. 5.11)*
- To apply a tourniquet to a lower limb, you can take advantage of the feature of opening the loop and closing it again, without having to slide it over the foot and lift the injured leg *(Fig. 5.12)*
- You can apply a tourniquet on yourself using the same modality

- Write the time of application of the tourniquet in the designated area or on the skin of the victim
- If bleeding persists, apply a second tourniquet directly above the first one
- Do not cover the tourniquet and keep checking that it is tight and properly positioned
- Check and reassure the injured person
- Manage shock

Applying a tourniquet on yourself

- Tighten the tourniquet by pulling the free extremity and closing it around the injured limb (you should not be able to insert your fingertips between it and your skin). Strongly tighten the tourniquet using the main lever, rotating it until you stop the bleeding and the distal pulse
- Securely fasten the lever to avoid release *(Pic. 5.13)*.
- Write the time of application of the tourniquet in the designated area or on the skin of the victim
- Do not cover the tourniquet and keep checking that it is tight and properly positioned
- If bleeding persists, apply a second tourniquet directly above the first one

First Aid Skill: Hemostatic Gauze (Optional)


5.16


5.17


5.18

- Verify safety and protect yourself
- Perform ABC check of the patient, and call Emergency Medical Services when possible
- If the victim is losing blood very rapidly and at first sight seems to be breathing normally, anticipate managing serious bleeding
- If it's not possible to manage serious bleeding with direct pressure, and it is not possible to apply a tourniquet on the area of the wound, it is possible to dab the wound with hemostatic gauzes *(Pic. 5.16)*

Applying hemostatic gauzes

- When possible, remove any accumulation of blood in the wound, leaving potential clots that may have already formed, and have started to reduce the bleeding
- Insert hemostatic gauzes inside the wound with your fingers, until you completely fill it up (excess gauzes can be left to cover the wound with a first layer) *(Pic. 5.17-18)*
- It could be necessary to use one of more full gauzes to stop the bleeding
- Immediately apply direct pressure to the site of the wound, and maintain it for at least 3 minutes


5.19


5.20


5.21

- Verify that external bleeding has stopped
- Leave hemostatic gauzes in the wound and apply a strong compression dressing with adequate emergency trauma dressing [for in-depth info, see instructor manual]
- Check and reassure the injured person
- Manage shock

SECTION 5

REVIEW QUESTIONS
(Multiple answers possible)

1. **When should you bandage a dressing in place?**
   a) After the bleeding has stopped (unless using a pressure bandage)
   b) Immediately
   c) After allowing the wound to air out
   d) Never

2. **You should always remove a impaled object?**
   a) True
   b) False

3. **You should try to reposition internal organs should they stick out of the abdomen?**
   a) True
   b) False

4. **With eye injuries you should bandage both eyes together?**
   a) True
   b) False

5. **In case of a blow to the eyes you can place a cold pack on the injured eye?**
   a) True
   b) False

Review answers can be found at the end of the book

?

SECTION 5 - 2

REVIEW QUESTIONS - Tourniquet
(Multiple answers possible)

1. **When should you use a Tourniquet?**
   a) In ase the procedures for managing serious bleeding (direct pressure to the wound) fail
   b) Immediately
   c) After letting the wound air out
   d) Never
2. **Was the tourniquet designed to be used only by one responder?**
   a) True
   b) False
3. **Should the tourniquet be applied exclusively on the skin?**
   a) True
   b) False
4. **Once it has been applied, the tourniquet must never be loosened.**
   a) True
   b) False
5. **The removal of a tourniquet must be carried out exclusively by medical personnel.**
   a) True
   b) False

Review answers can be found at the end of the book

SECTION 5 - 3

REVIEW QUESTIONS - Using hemostatic gauzes
(Ksjrgnjc _ lqucpq nmqqg`jc)

1. **When should you use hemostatic gauzes?**
   a) In case the procedures for managing serious bleeding (direct pressure to the wound) fail
   b) Immediately
   c) After letting the wound air out
   d) Never
2. **Does using hemostatic gauzes call for dabbing the wound by simply covering the wound from the outside?**
   a) True
   b) False
3. **Does the proper use of hemostatic gauzes call for dabbing the wound by inserting the gauzes inside the wound itself?**
   a) True
   b) False

Review answers can be found at the end of the book

Splinting techniques

6.1 Splinting

When you are dealing with bone or joint injuries, you may want to prepare a splint to immobilise the injury. If Emergency Medical Services are readily available, simply attempt to protect and stabilise the injury and wait for help. If you are in a remote location or emergency services are delayed, you can prepare a splint to prevent movement of the bones or joints that could cause further injury, and reduce pain by supporting the injured tissue.

Pic. 28: Immobilized fracture

You can use just about anything to immobilise an injured body part. They can be soft or rigid, made for the purpose or improvised from nearly any object.

Before you apply a splint, you should cut away all clothing or wetsuits from the injury site so you don't cause additional problems removing the covering. Remove all jewelry as well, because swelling may cause it to become trapped.

Next, cover all wounds, including open fractures, with sterile dressings. Avoid applying excessive pressure to the wound itself.

You should also check the pulse, motor function and sensation of the limb beyond the wound. These include capillary refill in the nail beds, movement of fingers or toes beyond the affected joint and sensation to light touch. You'll want to repeat these checks every 15 minutes after you apply the splint to make sure you are not impairing circulation.

When you prepare your splint, you will need to immobilise any joints above and below the injury. If you are splinting a forearm, for example, you will want to immobilise both the wrist and the elbow.

Any time you think a splint might be helpful, apply one, but do not attempt to push bones back below the skin. Simply pad the injury in place and prepare to evacuate the patient.

If medical care is delayed and if the extremity is severely deformed, is bluish or lacks a pulse, especially beyond the injury, you should gently pull on the extremity in its normal direction. This manual traction will align the bones and aid in the delivery of blood to the tissues.

However, if the patient feels pain, you feel resistance or hear grinding noises, stop what you are doing. Do not attempt to align joints using manual traction, this is strictly for long bone injuries. When you do use manual traction to align an injury, do not release the traction until the splint is in place.

Pic. 29: Applying a splint

After the splint is in place, continually reassess the patient and monitor for signs of shock.

Splints 6.2

In general, splints are applied to decrease movement and provide support and comfort through stabilisation of an injury. Splints are primarily used to stabilise non emergent injuries to bones until the patient can be evaluated by a consultant such as an orthopaedic surgeon.

Splints are also used to assist in primary healing or to temporarily immobilise an extremity prior to surgery (e.g., open fracture). Unlike casts, splints are non circumferential and often preferred in the emergency department setting, since injuries are often acute and continued swelling can occur.

Indications

A splint can be used for various injuries, including the following:

- Soft tissue injuries of the wrist and hand
- Fractures of the second, third, and fourth metacarpals
- Fractures of the second, third, and fourth phalanges
- Certain wrist fractures

Contraindications

- Absolute contraindications: none
- Relative contraindications in injuries that require immediate evaluation or intervention by a consultant (eg, orthopaedic surgeon, hand surgeon, plastic surgeon)
- Complicated fractures
- Open fractures
- Injuries with associated neurovascular compromise

Self made splints

When using sticks in the outdoors for splinting fingers, arms or ankles, it is important to use fresh green limbs as opposed to dead dry ones for the obvious reason of the dry limbs breaking.

It is important to remember that when using any bark or limbs, to make sure there are no insects under the bark, for example ants and termites, which may bite and cause discomfort.

Pic.. 30:
SAM® splint is extremely moldable

Pic.. 31:
Easily shaped on the arms or legs

Commercially available splints

Many kind of splints are commercially available, but most of them are big or made for one specific use, making it a bit difficult to carry it in a first aid kit.

Some splints, like the SAM™ Splint (*) are compact, easy to carry and easy to "mould" due to the materials they are made from, making them a good splinting tool that can be used to splint different kind of injuries.

These kind of splints are invaluable when for example on an outdoor expedition, where EMS might not be present immediately. It is also recommended to have at least one of these splints as a standard part of your first aid kit.

When dealing with falls from heights or in car accidents, you should worry about a cervical fracture (fracture of the neck). Some splints (like the SAM™ splint) can easily also be used for a cervical collar, which can immobilise the neck and prevent further problems, but a cervical collar is recommended to immobilise the neck.

(*) *The SAM (Structural Aluminum Malleable) Splint is a compact, lightweight, highly-versatile device designed for immobilizing bone and soft tissue injuries in emergency settings. It consists of a layer of strips of soft aluminum, with a polyethylene closed-cell foam coating.*

This splint can be given several forms and depending from how you bend the splint, the structure will become more rigid to avoid any movement.

The use of a cervical collar

- Maintain neutral alignment of the head. It is recommended that one person keeps the head while another person brings the collar in place (if more then one rescuer is available)
- Measure the dimension of the injured person neck with your fingers, (see the pictures for the correct measurement for cervical collar)
- Using the same fingers, choose the correct collar or adjust the size of the collar in order to have a collar of the correct size
- Hold the collar at the front with one hand on the chest of the injured person
- Slide the collar upwards towards the chin, until the collar is in the correct position.
- Close the collar at the back and secure it with the straps

Pic. 32:
Measure the key dimension on the patient with your fingers.

Pic. 33::
Correct measurement for a cervical collar.

First Aid Skill: Splinting

- Remember your own safety
- Activate EMS
- Immobilise any joints above and below the injury.
- With a forearm, for example, you will want to immobilise both the wrist and the elbow.
- Splint limb
- Choose an appropriate splint
- Splint the limb in the position found
- Splint on both sides of the limb if possible to avoid further movement
- Secure the splint
- Check the circulation

Note:

- Avoid standing on injured lower limb
- Don't try to reposition angulated or dislocated limbs
- Cool the injury with ice (for 15-20 minutes)
- Don't splint if EMS is available shortly
- If medical care is delayed and the extremity is severely deformed, is bluish or lacks a pulse, especially beyond the injury, gently pull on the extremity in its normal direction.
  - This manual traction will align the bones and aid in the delivery of blood to the tissues.
  - If the patient feels pain, you feel resistance or hear grinding noises, stop what you are doing.
  - Do not attempt to align joints using manual traction.
  - Do not release the traction until the splint is in place.
- After the splint is in place, continually reassess the patient and monitor for signs of shock.

SECTION 6

REVIEW QUESTIONS
(Multiple answers possible)

1. **When applying a splint, you need to make sure the joints above and below the injury move freely.**
   a) True
   b) False

2. **Try to push the bone back in place before you apply a splint.**
   a) True
   b) False

3. **When you expect a cervical fracture, the use of a cervical collar is recommended to immobilize the neck.**
   a) True
   b) False

Review answers can be found at the end of the book

Lifting and moving an injured person

7.1 Emergency moves

In an emergency, there are several different ways to move a patient. However, these techniques should only be used when there is immediate danger to the patient or yourself, or if you cannot properly assess the patient or provide the immediate critical emergency care necessary because of the patient's location or position. Your primary concerns are the danger of aggravating an existing spinal injury, so avoid any unnecessary movement.

Pic. 34:: Blanket drag techinque

To protect yourself, you should always remember to lift or move a person using the principles of body mechanics, including maintaining a straight rigid back and bending at the knees, not at the waist.

You should also keep your head in a neutral position, not flexed forward or extended back. Use your legs to lift, not your back.

When there is an immediate danger to your current location, such as from a fire, explosives or uncontrolled traffic at a scene, you can use several different drag techniques.

7.2 Armpit-forearm drag

To perform the armpit-forearm drag, reach under the patient's armpits from behind and grab his left forearm with your right hand and his right forearm with your left hand. Pull the patient in the direction of the long axis of the body.

7.3 Cloth tow technique

If the patient is wearing a shirt, other than a T-shirt, you can use it to support the patient's head and pull by grabbing the shoulders and col-

lar of the shirt. Support the patient's head with your fists, and pull along the long axis of the body. Be careful not to strangle the patient.

Blanket drag technique 7.4

Another effective technique is to use a coat or a blanket to drag the patient to safety. To get the patient onto the blanket, you will need to log roll him onto his side and then tuck the blanket underneath. Lay the patient back down and pull the other edge of the blanket out from underneath the patient. Gather the blanket into place underneath the patient's head and pull.

Pic. 35: Arm drag technique

Arm drag technique 7.5

The arm drag is another technique that could be used for emergency moves.
In this case you can drag the injured person by his arms, while he is still on the floor.

Direct ground lift - Extremity lift 7.6

To lift a patient off the ground, you can use a direct ground lift or an extremity lift. These techniques should be used only when there is immediate danger to the patient because none of these techniques allow you to adequately protect the patient's spine in case of a injury to the head, neck or spine. With heavier patients, a long backboard is more effective.

When this is not available, two or three rescuers should line up on the same side of the patient. Each rescuer should kneel on one knee, preferably the same knee. The first rescuer should maintain the head and neck in a neutral position with one hand and then place his other arm under the patient's lower back.

The second rescuer should place the patient's arms on his chest. He should then place one arm under the patient's knees and the other above the hips.

On a signal from the first rescuer, they should stand and move the patient to a stretcher, table or other surface.

Another option is the extremity lift. You should not use this technique if you suspect any injury to the spine or the extremities. One rescuer should kneel at the patient's head while the second kneels at the patient's side by his knees. The first rescuer should slip his hands under the

patient's arm pits and grasp the alternating wrists — right hand to left wrist and left hand to right wrist.

The second rescuer should then slip his hands under the patient's knees. Both rescuers should then move to a crouching position before attempting to stand all the way up, keeping their backs straight and heads neutral.

7.7 Chair carry technique

If the injured person is sitting in a chair, the chair can be used to move the person. If you are alone you can position yourself behind the chair and lift the front legs of the chair, while pulling the back of the chair. However, if the legs of the chair are thin or the injured person heavy ,the legs of the chair might break, what should be avoided at all times.

When you have a person who can help you, you can both place one hand under the chair and your other hand at the back. Then lift the chair simultaneously and you can walk with the chair and injured person to a safe place.

An alternative is to use your hands/arms as chair (also referred four handed seat) to as. Cross your and the helper's hands and take each others hands. The injured person can use your hands as a seat and should place his arms over the shoulders of you and the second rescuer. This is a technique that is used to transport a person with a leg or foot injury as it will remove all pressure and stress from the lower extremities.

7.8 Rautek technique

The Rautek technique is a technique that can be used with several small adjustments (the armpit-forearm drag is for example a modified Rautek technique).

The most common procedure to perform Rautek is:

- Go with your arms under the armpits of the victim, between his arm and body
- Bring one of the victim's arms in a right angle in front of his body
- Place your hand with closed fingers over the underarm between his elbow and wrist.
- Stand close to the victim and place your feet at both sides of the victim's body.
- Pull up the injured person by stretching your legs, while keeping your back as straight as possible (to avoid injury to your back)
- Pull the victim away from the danger. Keep the distance that you carry the victim as short as possible (just outside the danger zone is enough).
- Place the injured person on his back on the floor.

Pic. 36: Modified Rautek technique

If the injured person is sitting down it will be easy to use this technique. If the person lies on the floor you must first:

Pic. 37: Immobilizing the head

- Turn him on his back, if needed.
- Kneel at the left side of the victim, next to his shoulders
- Go with your right hand under the victim's neck and grab his arm pit with your hand (fingers)
- Place your left hand in the left armpit
- Bring the victim in one fluent movement in a sitting position by lifting him with your arms and positioning yourself close behind him.

Note:

When using this technique to extract a injured person from a car one hand can be used to immobilise the head/neck, while the other hand is used to block and pull the arm

The use of a back board / Long Spine Board 7.9

A long spine board (LSB), or backboard are used to prevent movement of the spine while moving a person.

A back board could be useful when more than one rescuer is available, but is normally not available during first aid. Although it is a standard piece of equipment for EMTs, Paramedics or rescue teams, it is too big to carry as personal first aid equipment. It also is frequently used for in water rescues.

The board often comes with body straps to secure the injured person to the back board and to avoid movement of spine while on the board. Head supports such as a rolled blanket or specially developed "head blocks" are used to avoid lateral rotation of the head. The board frequently gets used by health care professionals in conjunction with a cervical collar.

While the back board immobilizes the injured person, movement of the spine can be expected when placing the injured person on the board.

A correct lifting or rolling technique should be used to avoid movement of the spine (see spinal log roll or the direct ground lift technique).

Tips when lifting the board:

- The arms and hands have their greatest lifting strength when facing palm up.
- Your hands should be at least 25 cm apart whenever you grasp the backboard.
- Each hand should be inserted under the handle with the palm facing up and the thumb extended upward.
- Make sure that the underside of the handle is fully supported on your curved palm.

7.10 Lifting / Rolling techniques

Although emergency moves include lifting a part or the whole body of an injured person, there are some specific lifting and rolling techniques used to position an injured person on his back or to place this person on a blanket or back board, while avoiding as much as possible movement of the spine.

Therefore, some of the following techniques are also referred to as non emergency moves.

7.11 Log Roll: One rescuer

If the Injured person is not on his back, you should need to roll him in that position, while avoiding movement of the neck and back as much as possible:

- Kneel beside the injured person
- Carefully straighten the victim's arms and legs: place the arms close against his side.
- Support the head and neck with one hand
- Place the other hand on the far away elbow and squeeze it gently into his side
- Roll the victim towards you, while avoiding to twist his head, neck and back.

Pic. 38: Tighten the laces

Pic. 39: Final position of the head immobilizer

Pic. 40: Be sure to maintain the integrity of the spinal column.

- Bring him first on his side, while making sure movement is limited to a minimum and then roll him further onto his back

Note: When 2 or more rescuers are present, one can immobilise the head while the other persons rolls the injured person on his back.

Note: It is also possible to place the arm closest to the rescuer upwards, next to the head. This arm will then support the head while moving the body and the body does not have to roll over the arm.

Note: This technique can also be used when a person is on his back and need to be turned onto his side to clear the airway or when he needs to be placed on for example a blanket.

Spinal Log Roll: 4 rescuers 7.12

The log roll is used is to maintain a correct anatomical alignment in order to prevent the possibility of further injury.

At least 4 persons will be required to perform a correct and safe log roll:

1 person immobilises the patient's head

2 persons will need to support the chest, abdomen and lower limbs.

1 person is needed to place a blanket or back board under the injured person

Pic. 41-42:
Important! The rescuer at the head will coordinate all operations load without ever leaving the head

The steps in the spinal log roll procedure are as follows:

1. Make sure the injured person is in a supine position and anatomically aligned prior to start with the log roll.
2. Rescuer 1 places his hands at both sides of the injured persons head in order to stabilse it.
3. Rescuer 2 supports the victim's upper body, places one hand over the patient's shoulder to support the chest area, and the other hand over the thighs.
4. Rescuer 3 supports the victim's abdomen and lower limbs, overlaps with rescuer 2 to place one hand under the victim's back (hip), and the other hand over the knees. A pillow can be placed between the patient's legs to avoid movement while performing the roll.
5. On direction from the head holder, the victim is turned on his side in anatomical alignment in one smooth action.
6. Rescuer 4 can now position a blanket or back board under the victim.
7. On completion of the planned activity, the head holder will direct the other rescuers to return the victim to the supine position, onto the blanket or board. The victim must be left in correct anatomical alignment at all times.

4 person lift / Bridge lift 7.13

For this technique you need 4 persons/ rescuers. The "Bridge lift" makes it possible to place an injured person on a backboard without excessive movement of the spine if performed correctly.

It requires a certain strength from the rescuers as they will have to lift the complete body at the same moment while the rescuer positioned at the hips will have to carry the biggest weight.

The injured person needs to be in a supine position and if possible should wear a cervical collar before this technique gets applied.

The main rescuer or leader of the team should be positioned at the head. The second rescuer at the hips and a third rescuer at the legs, both facing the first rescuer. All three should have the injured person between their legs.

The 3 rescuers need to place their hands under the injured person, without moving him/her.

- Rescuer 1: hands under the shoulder blades wile protecting the head
- Rescuer 2: hands under the hips
- Rescuer 3: hands under the legs, between the knee and ankle

If all are positioned and ready, rescuer 1 will give the command to lift the injured person slowly and simultaneously .

At this point a fourth rescuer is used to position the back board or stretcher under the injured person, when the team is

Pic. 43a-43b-43c-43d:
Bridge lift sequence

lifting the person. The team should lift the injured person until such a height the back board or stretcher can be placed under the person.

Once the backboard/stretcher is in position and on the command of rescuer 1, the injured person can be lowered onto the back board or stretcher.

Note:

This technique (as well as the spinal Log Roll) is not used as a emergency move as it requires a certain amount of time and coordination in order to perform it correctly.

As first aid provider you might however be asked my the EMS to help them performing this technique when they prepare the injured person for transport.

7.14 General Considerations

Moving a patient should normally be done in an orderly, planned, and unhurried fashion to protect both the First Aid provider and the patient.

Carefully plan ahead and select the methods that will involve the least lifting and carrying.

Always consider whether there is another option that will cause less strain on you and the other first aid provider.

Note:

Persons with chest pain or difficulty breathing should sit in a comfortable position, as long as they are not hypotensive.

Certain conditions, such as head injury, shock, spinal injury, and pregnancy, require special lifting and moving techniques (some described above).

Spinal Injury 7.15

If we suspected a spinal injury we DO NOT MOVE the injured person, unless absolutely necessary. There are symptoms that can indicate a spinal injury such as neck pain, paralysis, numbness and weakness but the absence of them does not exclude spinal injury. In generally spinal injuries can be expected after a road traffic accident, sport incident or any kind of falls. In case of spinal injury provide cervical spine and head stabilisation. DO NOT permit movement of the body and the head must be aligned in a neutral position until the total spinal immobilisation is done correctly. You can use a cervical collar in order to immobilise the neck/head.

Pic. 44:
Do not move until the arrival of the EMS

The recommended action when you suspect a spinal injury is simply to immobilise the head of the injured person until EMS arrived at the scene of the accident. Do not allow an injured person to get out of his car seat when you expect a spinal injury and when no hazards are present that would require the person to leave the car (like fire).

Immobilisation of the head:

- Position yourself at the back of the injured person
- Place one hand on both side of the head
- If positioned on the ground, use your elbows to stabilise your arms/hands
- Keep the injured person still and no not allow movement of the head or neck
- Wait for the arrival of the EMS

First Aid Skill:
Moving an injured person (Rautek)

- Put your arms underneath the armpits
- Bring one of his arms at a right angle in front of his body *(Fig. 7.1)*
- Catch the person between his elbow and wrist
- Stand close to the injured person with your feet on both sides of his body
- Pull the injured person

Injured person on the ground:

- If necessary turn him on his back
- Kneel on the left hand side of the injured person, next to his shoulder
- Move your right hand underneath his neck and grasp his armpit with your hand (fingers)
- Put your left hand in the left armpit
- Bring the injured person in a sitting position with a sweeping movement by lifting him with your arms and moving just behind him *(Fig. 7.2)*

Note:
Your instructor may show you other techniques

Note:
Avoid moving injured person after head, neck or back injury

First Aid Skill:
Moving an injured person (Log Roll)

- Kneel beside the injured person
- Carefully straighten the arms and legs of the injured person: position the arms near his flank
- Support head and neck with a hand
- Put the other hand on the far elbow and pull softly
- First roll him on his side, paying attention to keeping movement at a minimum and roll him then on his back.

Note:

It is also possible to place the arm closest to the rescuer upwards, next to the head. This arm will then support the head while moving the body and the body does not have to roll over the arm.

SECTION 7

REVIEW QUESTIONS
(Multiple answers possible)

1. **You can move an injured person any time you want, if it makes it easier to provide first aid care.**
   a) True
   b) False

2. **A Long Spine board or back board can be used to prevent movement of the spine while moving a person.**
   a) True
   b) False

3. **The recommended action when you suspect a spinal injury is simply to immobilise the head of the injured person until EMS arrived at the scene of the accident.**
   a) True
   b) False

Review answers can be found at the end of the book

Temperature Related Injuries

Temperature related injuries 8.1

The human body operates in a fairly narrow band of temperatures. Overheating or cold conditions can quickly become a concern for first aid providers.

Hypothermia 8.2

Under most conditions your body maintains a healthy temperature. However, when exposed to cold temperatures or to a cool, damp environment for prolonged periods, your body's control mechanisms may fail to keep your body temperature normal. When more heat is lost than your body can generate, hypothermia can result.

Injury and illness from environmental exposure varies depending on the manner of exposure (wet or dry) and the amount of exposure (time, temperature, wind, and ambient air): wet or inadequate clothing, falling into cold water, and even having an uncovered head during cold weather can all increase your chances of hypothermia.

When doing activities such as camping, fishing, boating, diving and skiing in cold or wet weather conditions, you might become cold and/or wet faster then expected. It is recommended to move indoors and dry yourself when you get cold and wet - before you develop hypothermia.

Water for example has the ability to conduct heat away from the body 20–27 times faster than air. Any time a person is immersed in cold water, you should treat him as if hypothermia is present.

Cold weather emergencies range from localised frostbite to severe hypothermia with unresponsiveness and unconsciousness.

Classifications

MILD:
Mild hypothermia is classified as any time the body's core temperature drops to less than 35°C. The patient will be shivering and apathetic. He will have difficulty with motor skills, including a wobbling gait and awkward manual control. He will also possibly have amnesia.

MODERATE:
By this time the patient's shivering will have stopped as the patient's body core temperature has reached 31° C. The patient will be stuporous, and his heart beat and respirations will have slowed down. His pupils may be dilated.

SEVERE:

At this point, the patient's core temperature will be nearly 27°C. All of his voluntary actions will be gone as well as most of his reflexes.

AFTERDROP:
A major concern when caring for a patient who is hypothermic is after-drop. This happens when the colder blood in the extremities moves to the body core and can actually drop the body's core temperature during re-warming process. This can cause the patient to collapse further.

Signs and Symptoms:
The patient's health and predisposing factors may increase the likelihood of environmental illness and injury. Patients suffering from trauma, shock, hypoglycaemia, cardiovascular disease, malnutrition and stroke are at greater risk of developing hypothermia. Newborns, infants, drug & alcohol abuse patients and the elderly have increased predisposition to hypothermia as well.

Signs and symptoms of hypothermia include:
- Shivering
- Slurred speech
- Abnormally slow breathing
- Cold, pale skin
- Loss of coordination
- Fatigue, lethargy or apathy
- Confusion or memory loss.

Signs and symptoms usually develop slowly. People with hypothermia typically experience gradual loss of mental acuity and physical ability, so they may be unaware that they need emergency medical treatment.

Re-warming strategies
The best methods for re-warming a patient in hypothermia varies depending on available equipment, support and whatever else needs treated at the same time. You also have to balance two priorities, which are minimizing afterdrop and maximizing the re-warming.

To begin the process, you need to prevent any further heat loss. Remove any wet clothing and get the patient dried off. Always handle a hypo-

thermic patient gently. Rough handling can bring on cardiac arrest.

When caring for the patient, you should maintain the airway and breathing. If CPR is necessary, you should re-warm while doing compressions. There is a saying in the medical community that the only dead immersion victim is one who is warm and dead. They don't consider someone dead until they have warmed him up first.

On the other hand, if you will get the patient to medical help quickly, you may want to consider delaying re-warming. Medical professionals will have more efficient ways of warming the body from the inside out that won't have the concern with afterdrop.

Passive re-warming of the skin

Passive re-warming is simple and effective for mild cases. Cover the patient with a blanket (isothermic blanket if available) and let him shiver. Shivering is the body's way to re-warm itself. Let it happen. While it may sound cruel, allowing the patient to shiver is the best thing for him. Having the patient move around to warm him up will work faster, but it will also produce greater afterdrop and may complicate the situation.

A patient who is conscious and can control his airway can drink warmed fluids, although you should avoid caffeine or alcohol.

Active re-warming of the skin

During active re-warming heat is applied to the injured person or tissue.

Although the application of heat should not be to excessive.

Placing a hypothermic person close to a heat source or the use of hot packs during the re-warming process can help the effectiveness of first aid in moderate or severe hypothermia.

Note:

- Persons with hypothermia should be considered at high risk for ventricular fibrillation. It is important that they are handled gently and not re-warmed aggressively.
- The presence of delirium, bradycardia, hypotension and/or cyanosis is usually indicative of severe hypothermia.

Pic. 45:
Isothermic blanket

8.3 Frost bite

Frost bite is the freezing of skin or deeper tissue due to extreme cold. It is more likely to happen at the end of the extremities (hands/feet).

At about 0°C the blood vessels close to the skin start to constrict. This can lead to a reduced blood flow, which then can result in the freezing of the skin.

The sign of the frostbite are:

- Feeling like a needle prick in injured parts of the body, tingling
- Cold, numb part of the body
- Skin colour change, first pale, then blue stripes, finally black skin
- Skin has waxy appearance
- Blistering after warming up

Excessive movement of frostbitten tissue can cause ice crystals that have formed in the tissue to do further damage. Splinting and/or wrapping frostbitten extremities is therefore recommended to prevent such movement. For this reason, rubbing, massaging, shaking or applying physical force to frostbitten tissues in an attempt to re-warm them can be very harmful and is not recommended.

The First Aid for the frostbite is focused on moving the injured person to a warm environment and treat him/her for hypothermia. Treat him gently, avoid walking and movement of hands/feet. Start to Actively re-warm the injured person by immersing the injured tissue in a water-bath that is held just above body temperature only if the medical care is more than one hour away. Separate fingers or toes with sterile dressing and cover open blisters.

Active re-warming as described above is not recommended for more serious cases of frostbite outside of a hospital, but if you are in a remote location you might need to consider this option.

Wind Chill Factor 8.4

Wind chill is the apparent temperature felt on the exposed skin due to the wind.

This temperature (called wind chill factor) will be lower than the ambient air temperature.

To determine the wind chill factor you need to know both wind speed and air temperature. If for example the air temperature is -5°C and the wind speed is 50km/hr, the wind chill factor will be -15°C (see chart below).

The wind chill factor will make the body / exposed extremities loose heat faster, leading to hypothermia, but especially frostbites faster the expected.

Wind Speed (km/hr)	Air Temperature (Celsius)																
	0	-1	-2	-3	-4	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	-55	-60
6	-2	-3	-4	-5	-7	-8	-14	-19	-25	-31	-37	-42	-48	-54	-60	-65	-71
8	-3	-4	-5	-6	-7	-9	-14	-20	-26	-32	-38	-44	-50	-56	-61	-67	-73
10	-3	-5	-6	-7	-8	-9	-15	-21	-27	-33	-39	-45	-51	-57	-63	-69	-75
15	-4	-6	-7	-8	-9	-11	-17	-23	-29	-35	-41	-48	-54	-60	-66	-72	-78
20	-5	-7	-8	-9	-10	-12	-18	-24	-30	-37	-43	-49	-56	-62	-68	-75	-81
25	-6	-7	-8	-10	-11	-12	-19	-25	-32	-38	-44	-51	-57	-64	-70	-77	-83
30	-6	-8	-9	-10	-12	-13	-20	-26	-33	-39	-46	-52	-59	-65	-72	-78	-85
35	-7	-8	-10	-11	-12	-14	-20	-27	-33	-40	-47	-53	-60	-66	-73	-80	-86
40	-7	-9	-10	-11	-13	-14	-21	-27	-34	-41	-48	-54	-61	-68	-74	-81	-88
45	-8	-9	-10	-12	-13	-15	-21	-28	-35	-42	-48	-55	-62	-69	-75	-82	-89
50	-8	-10	-11	-12	-14	-15	-22	-29	-35	-42	-49	-56	-63	-69	-76	-83	-90
55	-8	-10	-11	-13	-14	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77	-84	-91
60	-9	-10	-12	-13	-14	-16	-23	-30	-36	-43	-50	-57	-64	-71	-78	-85	-92
65	-9	-10	-12	-13	-15	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
70	-9	-11	-12	-14	-15	-16	-23	-30	-37	-44	-51	-58	-65	-72	-80	-87	-94
75	-10	-11	-12	-14	-15	-17	-24	-31	-38	-45	-52	-59	-66	-73	-80	-87	-94
80	-10	-11	-13	-14	-15	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
85	-10	-11	-13	-14	-16	-17	-24	-31	-39	-46	-53	-60	-67	-74	-81	-89	-96
90	-10	-12	-13	-15	-16	-17	-25	-32	-39	-46	-53	-61	-68	-75	-82	-89	-96
95	-10	-12	-13	-15	-16	-18	-25	-32	-39	-47	-54	-61	-68	-75	-83	-90	-97
100	-11	-12	-14	-15	-16	-18	-25	-32	-40	-47	-54	-61	-69	-76	-83	-90	-98
105	-11	-12	-14	-15	-17	-18	-25	-33	-40	-47	-55	-62	-69	-76	-84	-91	-98
110	-11	-12	-14	-15	-17	-18	-26	-33	-40	-48	-55	-62	-70	-77	-84	-91	-99
	0 to -10 Low			-10 to -25 Moderate			-25 to -45 Cold			-45 to -59 Extreme			-60 Plus very Extreme				

First Aid Skill: Managing hypothermia


8.1


8.2


8.3

- Activate EMS in severe cases
- Move injured person out of the cold
- Remove any wet clothing or suit
- Warm the injured person with a isothermal blanket *(Fig. 8.1)*
- Put the person near a heat source
- Use hot packs - neck, armpits, groins (avoid burning the skin) *(Fig. 8.2 - 8.3)*
- Give a warm and calorie-rich drink (if the injured person is responsive)
- Support the injured person until his full re-warm
- Check ABC

Note:

Don't:

- allow hypothermic persons to walk or exercise
- rub the injured person
- elevate the legs
- allow the injured person to smoke and drink alcohol
- use body to body contact to re-warm

Rapid re-warming (immersing in hot water or direct heat use) can cause heart problems. In severe cases active re-warming should not delay definitive care.

8.5 Hyperthermia

Hyperthermia range from localised cramping to heat exhaustion and heat stroke .

8.5.1 Heat Exhaustion

Heat exhaustion is the result of your body overheating. Causes of heat exhaustion include exposure to high temperatures, particularly when combined with high humidity, and strenuous physical activity. This will lead to excessive sweating and is made worse by vomiting and diarrhea and heavy alcohol intake

Pic. 46:
Heat Exhaustion

This is a relatively mild condition that can become serious very quickly if its symptoms aren't addressed.

The signs and symptoms of heat exhaustion often begin suddenly and include a rapid pulse, dizziness, anxiety, irritability, headache and visual disturbances. The patient will also display normal to slightly elevated body temperatures but have pale, cool and sweaty skin. He may also have mild cramps, nausea and vomiting.

If you are helping a patient with heat exhaustion, you should keep him/her calm and cool him off slowly. Get him out of the heat and into air conditioning if available. You can also loosen or remove clothing and place an "ice" or "cold pack" in the neck of the person suffering from an heat exhaustion. You can also raise his/her feet for 20-30 cm (anti Shock)

If the person is conscious and does not have breathing difficulties, you can give fluids to re-hydrate him/her. Side effects of dehydration are low blood pressure and blood concentration. By re-hydrating, you reverse both of these conditions. Dehydration is thought to be a contributing factor to decompression illness (scuba diving injury).

When re-hydrating a patient, you want to avoid hyperglycemia. You also want to avoid a reduction in plasma osmolality, so you should use isotonic fluids if available. Of them all, sports drinks are pretty close to where you want to be. It isn't necessary to give the patient large volumes of fluid, and discourage the patient from drinking too quickly as that may cause vomiting.
If there is any doubt about the patient's condition, treat him for heat stroke.

Heat Stroke 8.5.2

This is a life-threatening position where the patient's body heat has risen beyond his body's ability to regulate it.

A patient suffering from heat stroke will have a rapid pulse and red, hot, dry skin. This may not be as evident with fit individuals. He may also have a headache and exhibit weakness, dizziness, anxiety or fatigue. He will probably not be sweating at this point.

Heat stroke requires aggressive intervention. You should alert the authorities and put the Emergency Assistance Plan into motion.

You need to rapidly and aggressively lower the patient's body core temperature. You should remove his clothing and cover him with a cool, water-soaked blanket. Get him in air conditioning if it is available. Cooling him with a fan or by spraying the skin with cool water is an option that can be considered. You will also need to give him oxygen and support his airway and breathing. To aid in cooling, you can place cold packs in his arm pits, groin and along his head and neck to keep him cool. You should be prepared for convulsions.

Pic. 47:
The dehydration associated with heat stroke can produce nausea, vomiting, headaches, and low blood pressure

If you are able, you should give the patient intravenous fluids, but don't use fluids that contain glucose. Also do not elevate the legs if the person has a heat stroke.

Note:
Stop cooling when the mental status returned normal and do not allow the injured person to resume the activity he was doing.

8.6 Other heat disorders

8.6.1 Heat (Muscle) Cramps

Heat cramps are muscle cramps caused by overexertion and dehydration in the presence of high temperatures. Signs & symptoms include: Normal or slightly elevated body temperature; generalised weakness; dizziness; warm, moist skin and cramps in the fingers, arms, legs or abdominal muscles.

Follow the first aid procedure for hyperthermia and do not apply heat to these kind of muscle cramps.

8.6.2 Fever (Pyrexia)

A fever is the elevation of the body temperature above the normal temperature for that person (~ 37 °C +/- 2 degrees). Fever is sometimes difficult to differentiate from heatstroke; however, there is usually a history of infection or illness with a fever.

8.6.3 Burns

Dealing with burns is difficult because they can damage the structure of the skin, impair its ability to function and damage the skin's ability to function.

Pic. 48:
Second degree burn

Burns can impair the body's fluid and chemical balance and body temperature regulation as well as its musculoskeletal, circulatory and respiratory functions.

There are three types of burns. They are superficial (1st degree), partial thickness burns (2nd degree) and full-thickness burns (3rd degree).

A superficial burn usually only involves the epidermis (outer layer of the skin). First-degree burns are caused by a flash of heat or flame, hot liquid or the sun. The skin will appear pink to red and will be dry. There may be slight swelling, but no blisters.

A partial thickness burn involves not only the epidermis, but also the lower layer, the dermis, as well. Usually, these burns occur from contact with fire, hot liquids or objects, chemical substances or the sun.

A partial thickness burn or second degree burn will appear white to cherry red, be moist and mottled. There may also be blisters on the skin. These burns are extremely painful.

A full-thickness or third degree burn involves all the layers of the skin and can extend into the muscle, bone or organs below. The skin will become dry, hard, tough and leathery, and may appear white and waxy to dark brown or black and charred. Typically, these burns are not very painful as the nerve endings have been destroyed.

As a first aid provider, it is not important for you to determine the seriousness of the burn. Your first responsibility is to remove the patient from the source of the burn and stop the burning process. You can stop the burning process with water or saline (tap water for 15/20 minutes or until EMS arrives), but do not keep the injury immersed.

If the burn was caused by a semi-solid or liquid such as tar, grease or oil, do not attempt to remove the substance.

You should immediately assess the patient's airway, breathing and mental status. Pay particular attention to any signs that the patient may have inhaled smoke or flame and caused damage to the upper airway. You should maintain the airway and provide supplemental oxygen.

If the patient is not breathing adequately, support his breathing. After you have stabilised the patient, cover the burned area with a dry sterile dressing. Using wet or most dressings may cause hypothermia because of the loss of heat regulation in the burned area.

You should never apply any ointments, lotions or antiseptics to burn injuries. These may cause heat retention, and the hospital staff would most likely have to clean it off anyway.

However, with small burns (1st and 2nd degree burns), including sun burn, you can apply special "burn gel" after you cooled the affected area. Burn gel is predominantly di-ionised, pure water which is thickened with a gelling agent to enable the water to stay in place over the wound site. While water is effective as a first aid for burns, it is difficult to keep in place. "Burn gel" gels the water to allow for effective and easy cooling directly on the burn site. Cover the area with a loose dressing if needed.

Pic. 49:
Third degree burn

Do not break blisters as this may cause further contamination and potentially cause fluid loss.

You should also continuously monitor the patient and treat for shock if any signs of that condition become apparent. It may sound odd, but keep the patient warm. The burns may have impaired his ability to regulate his own body temperature.

If the burn is on a finger or a hand, remove all jewellery if they don't sick to the burned skin. These can cause constrictions if the injury site swells. You should also separate the fingers and toes from each other with sterile dressings.

Do not attempt to open burned eyelids. If the burn was caused by heat, place a dressing over both eyes to prevent simultaneous movement of both eyes.

If the burn was caused by a chemical, flush the eye with water for at least 20 minutes.

Special types of burns

- **Chemical Burns** – Chemical substances found in the workplace and at home (like acid or alkaline) can cause severe damage to the tissue. The chemical reaction can also continue after the chemical substance has been wiped away from the skin. It is therefore important to rinse the affected area for a prolonged period of time with water and this as soon as possible.

- **Electrical burns** - Electricity can pass through the body and can cause burns and even a sudden cardiac arrest. Do not touch an injured person, which is a victim of an electrical shock, before you switched off the electricity.

Note:

Always refer to medical facility if:

- The injured person is under 5 years old or over 60
- a burn involves face, ears, hands, feet, the genital area or joints
- there are significant burns of the limbs, torso, or neck
- the burned area is more than 10% of the body (5% if under 16 years old)
- third degree burns are present
- the burns are electrical or chemical
- there is an "Inhalation" burn

Don't:

- Put butter on a burn
- Do not use direct ice on the skin
- Remove clothes if they are attached to the burned skin
- Break skin blisters
- In 3rd degree burn
- Cool
- Touch the burn or put anything on it
- Give the injured person anything to drink

First Aid Skill:
Managing heat exhaustion / heat stroke

- Remove person from the heat/sun
- Move a person into the shade or cool area
- Loosen or remove clothing
- Put ice or cold pack on the neck
- Raise the feet 20-30 cm
- Cool down body temperature (wet clothes or wet sheets)
- Administer water (if necessary salt solution)

Note:

In a heat stroke always activate EMS. In heat exhaustion seek medical care if the injured person's condition worsens or does not improve within 30 minutes.

Don't:

- elevate the legs if the person has a heat stroke
- apply heat to a muscle cramp
- continue cool a injured person after mental status returns to normal
- allow to resume the same activity

SECTION 8

REVIEW QUESTIONS
(Multiple answers possible)

1. **Water conducts heat away from the body ____ to _____ times faster than air**
   a) 12 to 20
   b) 20 to 27
   c) 5 to 10
   d) There is no difference

2. **Signs and symptoms of hypothermia include:**
   a) Shivering
   b) Slurred speech
   c) Loss of coordination
   d) Confusion
   e) Red, hot skin

3. **The first step in re-warming is to prevent further heat loss**
   a) True
   b) False

4. **Passive re-warming is effective for mild cases of hypothermia**
   a) True
   b) False

5. **Signs and symptoms of a frost bite include**
   a) Skin colour change
   b) Cold, numb part of he body
   c) Blistering after warming up

6. **When frost bites are present on the hands, have the injured person move or rub his hands**
   a) True
   b) False

Review answers can be found at the end of the book

?

7. Signs and symptoms of heat exhaustion include:

a) Rapid pulse
b) Dizziness
c) Elevated body temperature
d) Cool and sweaty skin
e) Nausea
f) Headache

8. Signs and symptoms of heat stroke include:

a) Rapid pulse
b) Weakness
c) Red hot dry skin
d) Excessive sweating

9. First aid actions for Hyperthermia include:

a) Move the injured person in a cool area
b) Remove clothing
c) Administer water or isotonic solutions
d) Use Ice or cold packs to reduce body temperature

10. First aid for 1st and 2nd degree burns include:

a) Cool the affected area with water for at least 15 minutes
b) Cover the affected area with burn gel if available
c) Put butter on the burned skin
d) Break blisters

11. With 3rd degree burns you should:

a) Touch the burned skin
b) Apply a lotion to the burn
c) Always refer to a medical facility

Review answers can be found at the end of the book

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Review Questions: Answers

Section 1:

1. a - b - c
2. a
3. c
4. a
5. b

Section 2:

1. a
2. d
3. c

Section 3:

1. a
2. b

Section 4:

1. a – b – c – d
2. a
3. a
4. b –c
5. a –b –c
6. c
7. a –b –c-d –e
8. a
9. a –b –c – d
10. a –b –c – d
11. a
12. a –b –c – d – e - f
13. b
14. a –b –c – d
15. a
16. a –b –c – e
17. b
18. b
19. a –b –c – d
20. a

Section 5 - 1:

1. a
2. b
3. b
4. a
5. a

Section 5 - 2:

1. a
2. b
3. a

Section 5 - 3:

1. a
2. b
3. b
4. a
5. a

Section 6:

1. b
2. b
3. a

Review Questions: Answers

Section 6:

1. b
2. b
3. a

Section 7:

1. b
2. a
3. a

Section 8:

1. b
2. a –b –c – d
3. a
4. a
5. a – b – c
6. b
7. a –b –c –d –e – f
8. a – b – c
9. a –b –c
10. a – b
11. c

Notes:

DAN Courses

Oxygen First Aid for Scuba Diving Injuries

Advanced Oxygen First Aid

On-Site Neurological Assessment for Divers

Medical Oxygen Rebreather

Oxygen First Aid for Aquatic Emergencies

Basic Life Support/BLS-D/PBLS-D

First Aid

First Aid for Hazardous Marine Life Injures

Dive Medicine For Divers

Dive Medical Technician

Fire Safety and Emergency Management Officer

Diving Center Operator

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