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МЕТОДИЧЕСКИЕ РЕКОМЕНДАЦИИ
для самостоятельного изучения теоретического материала

раздела «Первая помощь в чрезвычайных ситуациях»

Тема № 2: First aid treatment for cardiovascular emergencies

(для зарубежных студентов лечебного факультета)

Обсуждено на заседании кафедры

« ___ » _____ 2011 г.

Протокол № _____

Theme №2: First aid treatment for cardiovascular emergencies

Questions:

1. Structure of cardiovascular system
2. Cardiopulmonary resuscitation principles
 - 2.1. Priorities of treatment - A for Airway
 - 2.2. Priorities of treatment - B for Breathing (Principles; Rescue breaths)
 - 2.3. Priorities of treatment - C for Compressions (Principles; Technique; making compressions effective; When to stop; Obstructed airway)
 - 2.4. Making compressions effective
 - 2.5. When to Stop CPR
 - 2.6. CPR summary
3. Cardiovascular emergencies
 - 3.1 Heart attack and angina pectoris. Introduction. Possible signs and symptoms of heart attack and angina pectoris. First aid treatment for heart attack and angina pectoris.
 - 3.2. Stroke and TIA (transient ischaemic attack). Introduction. Possible signs and symptoms of stroke and TIA. First aid treatment for stroke and TIA.
 - 3.3. Left ventricular failure. Introduction. Possible signs and symptoms of left ventricular failure. First aid treatment for left ventricular failure.
 - 3.4. Shock.
 - 3.4.1. Introduction. Types of shock.
 - 3.4.2. Hypovolaemic shock. Introduction. Typical causes of hypovolaemic shock. Possible signs and symptoms of hypovolaemic shock. First aid treatment for hypovolaemic shock.

3.4.3. Cardiogenic shock. Introduction. Typical causes of cardiogenic shock. Possible signs and symptoms of cardiogenic shock. First aid treatment for cardiogenic shock.

3.4.4. Anaphylactic shock. Introduction. Typical causes of anaphylactic shock. Possible signs and symptoms of anaphylactic shock. First aid treatment for anaphylactic shock.

3.5. Fainting. Introduction. Possible signs and symptoms of fainting. First aid treatment for fainting.

3.6. Hypertensive crisis. Introduction. Possible signs and symptoms of hypertensive crisis. First aid treatment for hypertensive crisis.

3.7. Hypoglycemia (Insulin Shock). Introduction. Typical causes of hypoglycemia. Possible signs and symptoms of hypoglycemia. First aid treatment for hypoglycemia.

Key objectives:

1. To study the structure of cardiovascular system
2. To study cardiopulmonary resuscitation (CPR).
3. To study the basic cardiovascular emergencies, their introduction, possible signs and symptoms of the basic cardiovascular emergencies, first aid treatment for the basic cardiovascular emergencies.
4. To obtain the necessary first aid skills (assessment of the vitals; carrying CPR for adults, children, infants, first aid treatment for the basic cardiovascular emergencies).

Key conceptions:

Pulse, blood pressure, cardiovascular emergencies, conscious victim, unconscious victim.

Materials for study:

1. Structure of cardiovascular system

The circulatory system consists of a closed network of tubes (arteries, veins and capillaries) connected to a pump (the heart).

Arteries. Carry blood away from the heart. They have strong, elastic, muscular walls which are able to expand as blood from the heart beating surges through. The largest artery, which connects directly to the heart, is called the 'aorta'.

Veins. Carry blood towards the heart. They have thinner walls than arteries because the blood in them is under less pressure. They have one-way valves, which keep blood flowing towards the heart. The largest veins, which connect to the heart, are called 'vena cava'.

Capillaries. Are the tiny blood vessels between the arteries and veins which allow the transfer of oxygen, carbon dioxide and nutrients in and out of the cells of the body.

The Heart. Is a four-chambered pump. The left and right sides of the heart are separate. The left side takes blood from the lungs and pumps it around the body. The right side takes blood from the body and pumps it to the lungs.

The two sides of the heart are separated into two chambers called the 'atria' and the 'ventricles'. The atria are the top chambers which collect blood as it returns from the lungs and the body and pump it to the ventricles. The ventricles then pump the blood out of the heart, to the lungs and around the body.

The pulse

Every time the heart contracts a pulsation of blood is pumped through the arteries. The walls of the arteries are elastic and expand as the blood flows rhythmically through. This expansion can be felt at the points where arteries come close to the skin.

A "healthcare provider" checks the carotid pulse of a victim in the "recovery position".



When checking a pulse use the pads of the fingers, not the thumb (which has its own pulse). The First Aider should make a note of the following:

Rate. Is it fast or slow? How many beats are there per minute?

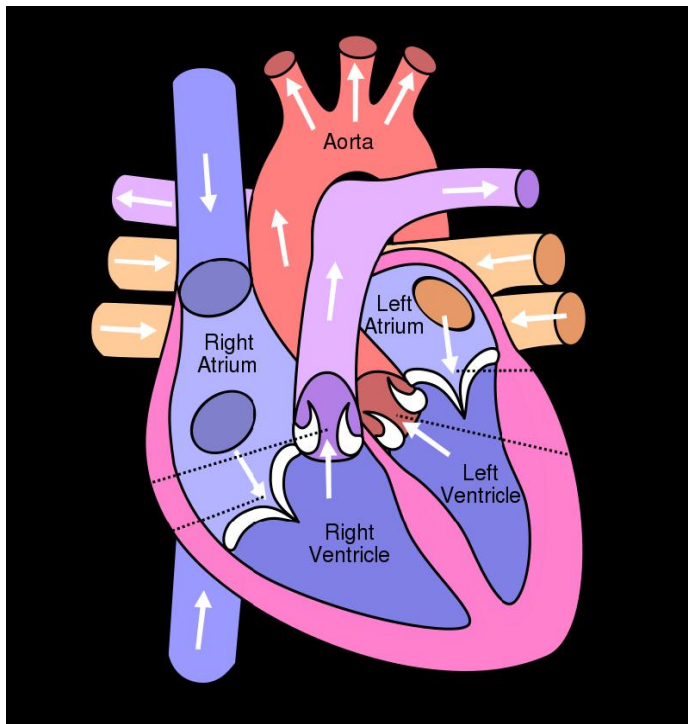
Rhythm. Are the beats regular? Are there any 'missed' beats?

Strength. Does the pulse feel strong or weak?

The main pulse locations for first aid use are in the neck (carotid pulse), the wrist (radial pulse) and the upper arm (brachial pulse).

Normal Heart Rates at Rest	
Adult	60 – 90 beats / minute
Child	90 – 110 beats / minute
Baby	110 – 140 beats / minute

Schematic of the human heart.



The blood pressure

Blood pressure (BP) is the pressure exerted by circulating blood upon the walls of blood vessels, and is one of the principal vital signs. During each heartbeat, BP varies between a maximum (systolic) and a minimum (diastolic) pressure. The mean BP, due to pumping by the heart and resistance to flow in blood vessels, decreases as the circulating blood moves away from the heart through arteries. Blood pressure drops most rapidly along the small arteries and arterioles, and continues to decrease as the blood moves through the capillaries and back to the heart through veins. Gravity, valves in veins, and pumping from contraction of skeletal muscles are some other influences on BP at various places in the body.

The measurement blood pressure without further specification usually refers to the systemic arterial pressure measured at a person's upper arm. It is measured on the inside of an elbow at the brachial artery, which is the upper arm's major blood vessel that carries blood away from the heart. A person's BP is usually expressed in terms of the systolic pressure over diastolic pressure (mmHg), for

example 120/80 mmHg. A sphygmomanometer, a device used for measuring arterial pressure.

Classification of blood pressure for adults		
Category	systolic, mmHg	diastolic, mmHg
Hypotension	< 100	< 60
Normal	100–130	60–85
Prehypertension	130–139	85–89
Hypertension	>140	>90

Average blood pressure in (mmHg):

Average blood pressure in (mmHg)		
1 year	6–9 years	adults
95/65	100/65	110/65 – 140/90

Capillary refill

Circulation to the end of an arm or leg can be checked by squeezing the tip of a finger or toe. The skin will become pale when it is squeezed - if the circulation is effective, the colour should return within 2 seconds of releasing it (this may take longer if the hands or feet are cold).

2. Cardiopulmonary resuscitation principles

A for Airway

The airway of the human body is one of the more important parts to be checked when providing first aid. The airway is the entrance point of oxygen and the exit point of carbon dioxide for the body. Should this become blocked, respiratory arrest or cardiac arrest (if left un-treated) may occur.

An unconscious person's airway may be blocked when their tongue relaxes and falls across the airway. The technique used to open the airway is called the "head-tilt chin-lift" technique. The victim must be supine (lying on their back).

With one hand on the forehead and the other hand under the chin, the victim's head is tilted back, and their chin lifted. The victim's jawline should be perpendicular to the ground.

Conscious victims can normally maintain an open airway; if the victim is talking or has no respiratory distress, their airway is adequate.

You may also check the airway for visible, removable obstructions in the mouth, which you could remove with a finger. You can remove any item in the mouth which is removable, but should not waste time trying to remove lodged items such as dentures.

If a conscious victim's airway is obstructed by a foreign object, the object must be removed. Abdominal thrusts are the standard method for conscious victims. Refer to Obstructed Airway for unconscious procedures.

B for Breathing

Principles

Human respiration works by inspiring fresh air, absorbing part (but not all) of the oxygen in it, which is then distributed to the cells by the blood, and exchanging carbon dioxide. Lungs have a capacity of a dozen of liters.

When a victim stops breathing, spontaneous respiration can restart if stimulated by insufflations. However, a victim in respiratory arrest is likely to fall into *cardio-respiratory* arrest.

Checking the respiration

After opening the victim's airway, check for breathing. To do this, place your cheek in front of the victim's mouth (about 3-5 cm away) while looking at their chest. You can also gently place a hand on the centre of the victim's chest if you wish. You may be able to detect the following signs if the victim is breathing:

1. Feel the airflow on your cheek

2. Hear the airflow
3. See the chest rise and fall
4. Smell the breath of the victim
5. Feel the chest rise and fall under your hand (if you have placed it on the chest)

Search for these signs for 10 seconds. If there is no breathing, you must start CPR.

Rescue Breaths

Regional Note - In Europe, give 5 rescue breaths for victims of:

- Drowning
- Trauma
- Drug overdose

For other victims, begin with compressions instead of rescue breaths.

Rescue breaths must be provided to victims in a state of respiratory arrest; *do not* provide them to a weakly breathing victim. If you cannot detect the breath of the victim, begin CPR.

If you have a CPR mask, use it to protect yourself and the victim from exchange of body fluids. Cheap, keyring-sized CPR masks are available in most pharmacies. Make sure you read the instructions for how to use any equipment you buy. However, chances are that you will find yourself unequipped; do your best with what you have, but do not place yourself in danger by direct contact with body fluids, such as blood - proceed to compressions only.

Start by giving two rescue breaths.

- Maintain an open airway using the head-tilt chin-lift
- Plug the nose of the victim with your free hand

- Put your mouth on the mouth of the victim in an airtight manner, and blow into the mouth of the victim, do not blow forcefully as this may cause the air to enter the stomach, which will cause vomiting, the best way to avoid this is to blow air into the mouth just enough to make the chest rise

- Let the air exit, and give another breath

Continue with CPR compressions.

C for Compressions

Principles

The purpose of doing chest compressions is to effectively squeeze the heart inside the victim's chest, causing blood to flow. This allows the normal gaseous exchange between the lungs, bloodstream and tissues to occur. Compressions are now usually performed before any rescue breaths due to the fact that when normal breathing and circulation stop, there is still a good amount of residual oxygen left in the bloodstream (as it has no way to exchange out of the body).

Technique

The aim is always to compress in **the center of the chest**, regardless of the victim. This means that compressions are performed on the sternum or breastbone of the victim, approximately in line with the nipples on males and children.

Compressions for infant CPR are done with two fingers.

For adults (>8) - place the palm of one hand in the centre of the chest, approximately between the nipple line (on adult males – for females, you may need to approximate the ideal position of this line due to variations in breast size and shape). Bring your other hand to rest on top of the first hand, and interlock your fingers. Bring your shoulders directly above your hands, keeping your arms straight. You should then push down firmly, depressing the chest to about one third (1/3) of its depth.

For children (1-8) - place the palm of one hand in the centre of the chest, approximately between the nipple line. Bring your shoulder directly above your hand, with your arm straight, and perform compressions to one third (1/3) the depth of the chest with one arm only.

For infants (<1yr) - Use your forefinger and middle finger only. Place your forefinger on the centre of the child's chest between the nipples, with your middle finger immediately below it on the chest, and push downwards using the strength in your arm, compressing the chest about one third (1/3) of it's depth.

Give 30 compressions in a row, and then two (2) rescue breaths. Then restart your next cycle of compressions.

Making compressions effective

You MUST allow the ribs to come all the way back out after each compression, followed by a brief pause. This allows the heart's chambers to refill. Spacing compressions too close together will lead to them being ineffective.

You are aiming for a rate of 100 compressions per minute, which includes the time to give rescue breaths. In practice, you should get just over 2 cycles of 30 compressions in along with breaths per minute.

Almost everyone compresses the chest too fast - Experience shows that even well trained first aiders tend to compress the heart too fast. The rate you are aiming for is only a little over one per second. The best equipped first aid kits should include a Metronome with an audible 'beep' to match your speed to. Many public access defibrillators have these included in their pack. If one is not available, count the number of compressions with the word 'and' between them. When you press down on the chest, say the number, when the chest rises say 'and'. this way, you will be saying 'one-and-two-and-three...'

Keep your arms straight - A lot of television and films show actors 'performing CPR' bending their elbows. This is not correct - you should always keep your arms straight, with your elbows locked and directly above your hands.

It often helps to count out loud - You need to try and get 30 compressions per cycle, and it helps to count this out loud or under your breath. Performing compressions is tiring, and you may not be able to count out loud for the duration, but ensure you keep counting.

If you lose count, don't stop, just estimate - It is important to carry on once you've started, so if you lose count, don't panic, and simply estimate when 30 compressions is over, and do 2 breaths, then start over counting again.

You are likely to break ribs - When performed correctly, especially on older people, compressions are more likely than not to break ribs or the sternum itself. You should carry on regardless of this occurring. It is a sign that you are performing good, strong compressions. Oftentimes the cracking sound you will hear is just the cartilage of the ribs and sternum breaking, and not the bones themselves. If bystanders are concerned about injury to the victim, you may want to remind them of the *life over limb* principle and assure them that it is normal to hear these sounds.

When to stop SPR

You should continue giving the victim CPR until:

- **The victim starts breathing spontaneously** - This does not include gasping, called *agonal breathing*. Victims are also likely to make sighing noises or groans as you perform chest compressions - this should not be mistaken for breathing.

- **The victim vomits** - This is an ACTIVE mechanism, meaning the victim moves and actively vomits. Not to be confused with regurgitation, where stomach

contents make their way passively in to the mouth. If the victim vomits, roll them to their side, clear the airway once they're done vomiting and reassess ABCs.

- **Qualified help arrives** and takes over. This could be a responder with a defibrillator, the ambulance service or a doctor. However **DO NOT STOP** until told to do so. They are likely to require time to set up their equipment, and you should continue with CPR until instructed to stop. They are likely to work around you, placing defibrillation pads on the victim's chest while you continue compressions. Continue working as normal, and let them work around you.

- **You are unable to continue** - CPR is physically very demanding, and continued periods can be exhausting. Try to change places frequently with another trained rescuer to lessen the chance of exhaustion.

- **You put yourself in danger by continuing** - Hazards may change, and if your life is endangered by a new hazard, you should stop CPR. If possible, remove the victim from the hazardous situation as well.

Obstructed Airway

If your ventilations don't go in, try adjusting the angle of the head (usually tilting it further back) and re-attempt ventilation. If the breath still doesn't go in, then do your compressions, and check the airway for obvious foreign obstructions after the compressions. If you see a foreign obstruction, remove it with your fingers if possible. Do not discontinue CPR because the airway is occluded.

CPR summary

Area - check the area

Look for hazards. If there are hazards, remove them, or remove the victim from them if possible. If not, then retreat to a safe distance, call EMS and wait for their arrival. Make sure that you do not put yourself in danger. If you are near a road, ensure that you are clearly visible to traffic.

Put on gloves if you have them.

Awake - check level of consciousness

Does the victim respond to voice or painful stimulus?

If YES, check the victim for other conditions and call for help if necessary.

If NO, call EMS.

Ambulance - call EMS

Call EMS using a bystander if possible. If you're alone, and the victim is an adult (>8 years old), then leave the victim to call EMS yourself. If you're alone but the victim is a child (1-8 years old) or an infant (<1 year old), then continue; you'll call EMS later.

Obtain an AED and AED-trained responder if possible.

Airway - open the airway

Quickly remove any loose and obvious obstructions from the mouth. Then tilt the head back and lift the chin so the victim's jawline is perpendicular to the ground

Breathing - check for breathing

Correct position for CPR. The arms are fully extended and the thrusts are given from the hips.

Is the victim breathing?

If YES, place the victim in the Recovery position and call for help unless a spinal injury is suspected in which it is crucial to **not move the patient**. If the patient vomits, however, it is more important to roll them over to their side while holding the back, neck, and head stable. **If NO**, give 2 rescue breaths and begin compressions.

Compressions – begin compressions

CPR Table

Age Group	Adult	Child	Infant
Single-Person	30-2	30-2	30-2
Two-Person	30-2	15-2	15-2
Technique	Both hands	One hand	Two fingers

- Adult technique: top hand pulls bottom hand's fingers back while also applying pressure.
- Rescue Breaths are given at a rate of 2-3 seconds between breaths.
- Compressions are at a rate of 100 per minute.
- Hand/finger placement is just below the nipple line and above the bottom of the breast bone, just slightly to the (victim's) left.
- After 5 cycles (approx. 2 minutes) call EMS if you haven't done so already (in the case of children or infants).

After 5 cycles (approx. 2 minutes) call EMS if you haven't done so already (in the case of children or infants). If a bystander is available, get them to call immediately upon arrival.

Continue CPR until emergency help takes over, the victim moves or takes a breath, or you are too exhausted to continue. If an AED and AED-trained responder arrives on the scene, it will have priority on the over CPR. Continue CPR until the AED operator asks you to stop.

3. Cardiovascular emergencies

Cardiovascular emergencies are life-threatening disorders that must be diagnosed quickly to avoid delay in treatment and to minimize morbidity and mortality.

Heart Attack & Angina pectoris

Introduction

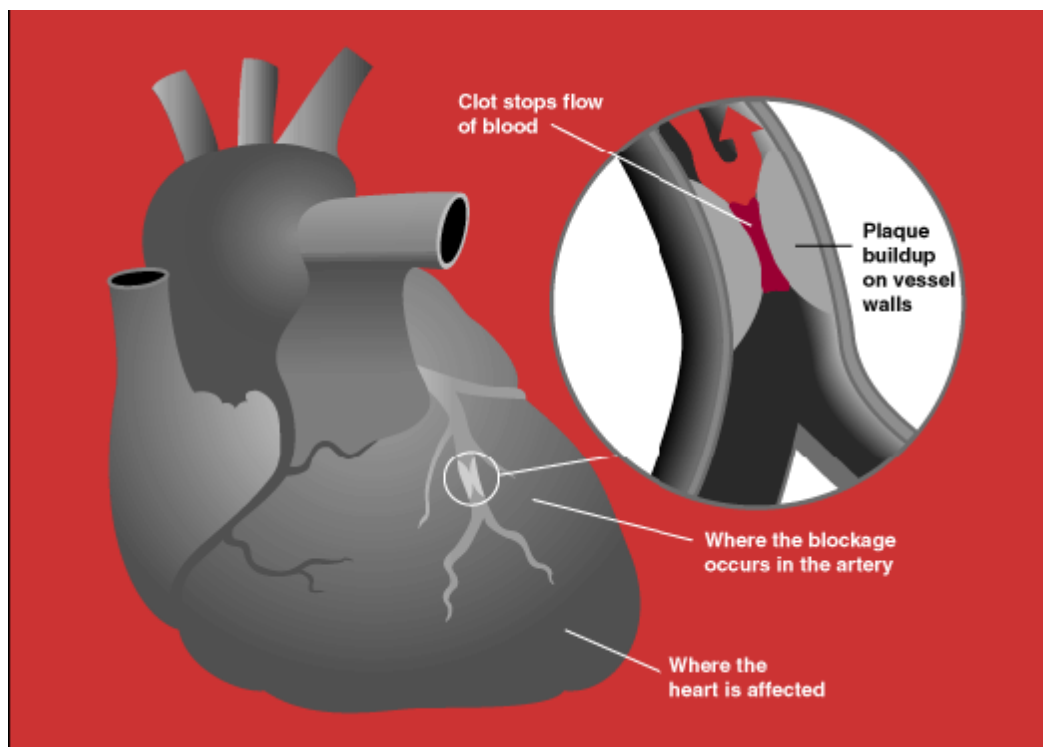
Heart attack (myocardial infarction) is when blood supply to the heart or part of the heart is cut off partially or completely, which leads to death of the heart muscle due to oxygen deprivation. Heart attacks usually occur after periods of rest or being recumbent, and only rarely occur after exercise (despite popular portrayal). Heart attack is often caused when the surface of a cholesterol plaque in a coronary artery cracks and has a 'rough surface'. This can lead to the formation of a blood clot on the plaque, which completely blocks the artery resulting in the death of an area of the heart muscle. Unlike angina, the death of the heart muscle from heart attack is permanent and will not be relieved by rest.

Angina (angina pectoris) is a 'miniature heart attack' caused by a short term blockage. Angina is a condition usually caused by the build up of a cholesterol plaque on the inner lining of a coronary artery. Cholesterol is a fatty chemical which is part of the outer lining of cells in the body. A cholesterol plaque is a hard, thick substance caused by deposits of cholesterol on the artery wall. Over time, the build up of the plaque causes narrowing and hardening of the artery. Angina almost always occurs after strenuous exercise or periods of high stress for the victim. During exercise or excitement, the heart requires more oxygen, but the narrowed coronary artery cannot increase the blood supply to meet this demand. As a result an area of the heart will suffer from a lack of oxygen. The patient will feel pain in the chest (amongst other symptoms) as a result.

Typically, an angina attack occurs with exertion, and subsides with rest. If the narrowing of the artery reaches a critical level, angina at rest (called 'unstable angina') may result. A patient with angina, especially 'unstable' angina has a high risk of suffering a heart attack in the near future.

The key differentiation between a heart attack and angina is that, in line with their typical onset modes, angina should start to relieve very shortly after resting (a few minutes), whereas a heart attack will not relieve with rest.

Heart attack can be caused by blockage in arteries supplying blood to the heart.



Possible signs and symptoms of angina pectoris and heart attack

It should be remembered that every heart attack is different. Only a few of the signs and symptoms may be present, indeed up to a quarter of heart attacks suffered are 'silent' without any chest pain.

- Chest pain: tightness in the chest or between the shoulder blades, often radiating into the left arm, and the jaw
- Nausea or indigestion (especially in women)
- Pale, clammy skin
- Ashen grey skin
- Impending sense of doom

• Denial

Symptoms	Angina pectoris	Heart attack
Onset	Sudden, usually during exertion, stress or extreme weather.	Sudden, can occur at rest.
Pain	'Vicelike' squashing pain, often described as 'dull', 'tightness' or 'pressure' on the chest. Can be mistaken for indigestion.	Vicelike' squashing pain, often described as 'dull', 'tightness' or 'pressure' on the chest. Can be mistaken for indigestion.
Location of Pain	Central chest area. Can radiate into either arm (more commonly the left), the neck, jaw, back or shoulders.	Central chest area. Can radiate into either arm (more commonly the left), the neck, jaw, back, or shoulders.
Duration	Usually lasts 3 to 8 minutes rarely longer.	Usually lasts longer than 30 minutes.
Skin	Pale, may be sweaty.	Pale, grey colour. May sweat profusely.
Pulse	Variable, depending on which area has a lack of oxygen. Often becomes irregular, missing beats.	Variable, depending on which area has a lack of oxygen. Often becomes irregular, missing beats.
Other Signs and Symptoms	Shortness of breath, anxiety.	Shortness of breath, dizziness, nausea, vomiting. Sense of weakness, 'impending doom'.
Factors Giving Relief	Resting, reducing stress, taking.	'G.T.N.' medication may give partial or no relief.

First aid treatment for angina pectoris and heart attack

Assist the victim with medication, if they have any. People with angina will often have medication to control it; either as pills or a spray. The pills should never be touched with bare skin by the rescuer, as they may cause a migraine headache, and they are placed under the tongue for absorption. The spray should be taken on the bottom of the tongue.

Only the victim should administer his medication. If he is unable to do so, then the rescuer should not do it for him. Helping to take the lid off or handing the bottle to the victim is fine, this should be documented if patient is transferred to other rescuers.

- Loosen tight clothing, especially around the neck
- Sit the casualty down and make them comfortable. Do not allow them to walk around. A half sitting position is often the best.
- Allow the casualty to take their own glyceryl tri-nitrate (G. T.N.) medication if they have it.
- Reassure the casualty. Remove any cause of stress or anxiety if possible.
- If you suspect heart attack - check the casualty is not allergic to aspirin, older than 16 and not already taking 'anti-coagulant' drugs (such as warfarin). If this is the case, allowing them to chew an aspirin tablet slowly may be beneficial. If you are unsure however, wait for the ambulance crew to arrive.

NOTE: Aspirin reduces the clotting ability of the blood. Chewing the tablet allows the drug to absorb quickly into the blood through the skin of the mouth, so it works faster. The ideal dose is a 300mg aspirin, but any strength will do.

- Continue monitoring vitals.
- Be prepared to do CPR should the victim go into cardiac arrest.

Call for an ambulance if:

- You suspect a heart attack.
- The casualty has not been diagnosed as having angina.
- The symptoms are different, or worse than the patients' normal angina attacks.
- Angina pain is not relieved by the patients' medication and rest after 15 minutes.
- You are in any doubt.

NOTE: A first aider is not allowed to 'prescribe' drugs to a patient. A fully conscious adult casualty is, however, more than capable of deciding whether or not they want to take medication that may help them.

Stroke and TIA (transient ischaemic attack)

A **Stroke** is a small blockage in a blood vessel of the brain, which causes oxygen starvation to that part. This oxygen starvation can cause a loss of function, related to the area of the brain affected. Dependant on the length of time the area is blocked, the damage may become irreparable. The blockage is usually caused by a small blood clot, although incursions such as air bubbles can have the same effect.

There are two main types of stroke - a **CVA** (Cardiovascular Attack - sometimes called just a stroke or major stroke) and a **TIA** (Transient Ischaemic Attack - sometimes called a mini-stroke).

The difference between a CVA and a TIA is simply the duration of the symptoms. If the symptoms pass

Possible signs and symptoms of stroke and TIA

Best Practice. To test for the affected side of a stroke, have the victim squeeze your hands at the same time. You will notice a difference in pressure that they may not.

The key recognition signs for a stroke can be remembered with the acronym FAST, which stands for:

- **Facial Weakness** - Can the person smile? has their eye or mouth drooped?
- **Arm Weakness** - Can the person raise both arms and hold them parallel? If they squeeze your hands can they exert equal force?
- **Speech problems** - Can the person speak clearly and understand what you say
- **Test all three symptoms**

The patient may also experience additional symptoms, which on their own do not indicate a stroke. These include:

- Sudden blurred, dim or patchy vision
- Sudden dizziness
- Sudden, severe, unusual headache

First aid treatment for stroke and TIA

Conscious victim

- Call for an ambulance
- Reassure the victim
- Encourage and facilitate the victim to move in to a position of comfort if possible. If they have significant paralysis, they may be unable to move themselves, so you should make them as comfortable as possible where they are. If possible, incline them to the unaffected side (if there is one), as this will help you relieve some symptoms such as a feeling of floating.

- Take vitals, history and regular observations

Unconscious victim

- Call for an ambulance
- Assess the victim's ABCs (attempt CPR if not breathing)
- Assist the victim into the recovery position on their **unaffected** side where gravity may assist blood to reach the injured side of the brain, which is below the unaffected side of the brain. Additionally, bleeding (if any) may drain out the ear.

Left ventricular failure

Left ventricular failure (LVF) is a condition where the left ventricle of the heart is not powerful enough to empty itself. The right chamber of the heart is still working properly and pumping blood into the lungs. This results in a 'back pressure' of blood in the pulmonary veins and arteries of the lungs. Fluid from this back pressure of blood seeps into the alveoli (see page 15) causing severe difficulty in breathing.

The condition can be caused by heart attack, chronic heart failure or high blood pressure. Patients with chronic heart failure often suffer attacks during the night.

Possible signs and symptoms of left ventricular failure

- Severe difficulty in breathing.
- Crackly, often wheezy breathing (fluid on in the lungs).
- Pale sweaty skin.
- Cyanosis (blue grey tinges to skin and lips).
- Coughing frothy, blood stained sputum.
- Possibility of the signs and symptoms of heart attack.
- The patient needs to sit up to breathe.
- Anxiety, confusion, dizziness.

First aid treatment for left ventricular failure

- Sit the patient up, feet dangling.
- Call for an ambulance.
- Allow the patient to take their own glyceryl tri-nitrate (G. T.N.) medication if they have it.
- Be prepared to resuscitate - the condition can quickly deteriorate.

Shock

Shock is a range of related medical conditions where the delivery of oxygen and nutrients is insufficient to meet the body's needs. The main carrier of oxygen and nutrients in the body is the blood, so most causes are related to the blood, with the most common first aid consideration being loss of blood. Shock is a life-threatening emergency, it should not be confused with a feeling of extreme surprise - one does not lead to the other.

Key types of shock:

- Hypovolaemic shock
- Cardiogenic shock
- Anaphylactic shock

Hypovolaemic shock

This is caused by the loss of blood from the circulatory system.

Typical causes of hypovolaemic shock are:

- External bleeding.
- Internal bleeding.
- Burns.
- Vomiting and diarrhea (loss of body fluids).
- Excessive sweating.

Possible signs and symptoms of hypovolaemic shock

The first response is release of adrenaline - this will cause:

- A rise in pulse rate.
- Pale, clammy skin (for dark skinned casualties look at the colour of skin inside the lips).

As the condition worsens:

- Fast, shallow breathing.
- Rapid, weak pulse.
- Cyanosis (grey blue tinges to skin and lips).
- Nausea or vomiting.
- Dizziness, weakness.
- Sweating.

As the brain suffers a lack of oxygen:

- Deep, sighing breathing (air hunger).
- Confusion, anxiety, even aggression.
- Unconsciousness.

First aid treatment for hypovolaemic shock

- Treat the cause of the shock (e.g. external bleeding).
- Lay the casualty down and raise their legs about 6-12 inches (15-30cm) off the ground, returning blood to the vital organs (take care if you suspect a fracture).
- Call for an ambulance.
- Keep the casualty warm. Place a coat or blanket under the patient if they are on a cold surface, but take care not to overheat them (as that would dilate blood vessels, causing the blood pressure to fall even more).
- Do not allow the patient to eat, drink or smoke.
- Loosen tight clothing around the neck, chest or waist.
- Monitor breathing, pulse and levels of response.

- Be prepared to resuscitate.

Cardiogenic shock

This is where the blood is not pumping effectively through the body - usually caused by heart problems, such as a heart attack.

Typical causes of cardiogenic shock are:

- Heart attack.
- Cardiac failure.
- Heart valve disease.
- Tension pneumothorax.
- Cardiac arrest

Possible signs, symptoms and treatment for cardiogenic shock similar possible signs, symptoms and treatment of heart conditions.

Anaphylactic shock

Anaphylaxis is an extremely dangerous allergic reaction. The name 'anaphylaxis' means 'without protection' and indeed, the condition is caused by a massive over-reaction of the bodies protection (immune) system.

Severe anaphylactic reactions are very rare. The most common reactions are to drugs (such as penicillin). Other common allergies are to things such as insect stings, peanuts, seafoods etc.

The main chemical that the immune cells release if they detect a 'foreign protein' is histamine. Histamine has several effects on the body when it is released in massive quantities:

- It makes blood vessels dilate.
- It constricts the bronchioles in the lungs.
- It makes blood capillary walls 'leaky', causing severe swelling and shock.

- It weakens the strength of the heart's contractions.
- It makes the skin itchy.
- It makes the skin come out in a rash.

Possible signs and symptoms of anaphylactic shock

The allergic reaction can happen in seconds, so fast recognition is essential:

- Sudden swelling of the face, tongue, lips, neck and eyes.
- Hoarse voice, 'lump in the throat', developing into loud pitched noisy breathing (which may stop altogether).
- Difficult, wheezy breathing, tight chest (the patient may have the equivalent of an asthma attack as well as a swollen airway).
- Rapid weak pulse.
- Nausea, vomiting, stomach cramps, diarrhea.
- Itchy skin.
- Red, blotchy skin eruption.
- Anxiety - a feeling of 'impending doom'.

First aid treatment for anaphylactic shock

- Call for an ambulance.
- Lay the casualty in a comfortable position:
- If the casualty has airway or breathing problems they may prefer to sit up as this will make breathing easier.
- If the casualty feels faint however - do not sit them up. Lay them down immediately. Raise the legs if they still feel faint.
- The casualty may carry an auto-injector of adrenaline. This can save the casualty's life if it's given promptly. The patient should be able to inject this on their own but, if necessary, assist them to use it.
- If the casualty becomes unconscious – check airway and breathing and resuscitate as necessary.
- The dose of adrenaline (epinephrine) can be repeated at 5 minute intervals if there is no improvement or symptoms return.

Fainting

Fainting is caused by poor nervous control of the blood vessels and heart.

When a casualty faints, the blood vessels in the lower body dilate and the heart becomes slow. This results in the blood pressure falling and the patient has a temporary reduction in blood supply to the brain.

Typical causes of fainting are:

- Pain or fright.
- Lack of food.
- Emotional stress.

Possible signs and symptoms of fainting

- Temporary loss of consciousness, falling to the floor.
- Slow pulse.
- Pale, clammy skin.
- Long periods of inactivity (such as standing or sitting).
- Heat exhaustion.
- Before the faint the casualty may have suffered nausea, stomach ache, blurred vision or dizziness.
- Quick recovery.

First aid treatment for fainting

- Lay the casualty down and raise their legs in the air, returning blood to the vital organs.
- Check Airway and Breathing.
- Remove causes of stress, crowds of people and allow plenty of fresh air.
- Reassure the casualty as they recover. Do not allow them to sit up suddenly.
- If they feel faint again, repeat the treatment. Look for an underlying cause.
- If the casualty does not recover quickly or you are unsure: check airway and breathing again, place them in the recovery position and call for an ambulance.

Hypertensive crisis

A hypertensive crisis is a severe increase in blood pressure that can lead to a stroke. Extremely high blood pressure — a systolic (top number) blood pressure of 180 millimeters of mercury (mm Hg) or higher or a diastolic (bottom number) blood pressure of 120 mm Hg or higher — damages blood vessels. They become inflamed and may leak fluid or blood. As a result, the heart may not be able to pump blood effectively.

Causes of a hypertensive emergency include:

- Forgetting to take blood pressure medication
- Stroke
- Heart attack
- Heart failure
- Kidney failure
- Rupture of body's main artery (aorta)
- Interaction between medications
- Convulsions during pregnancy (eclampsia)

A hypertensive crisis is divided into two categories: urgent and emergency. In an urgent hypertensive crisis, blood pressure is extremely high. In an emergency hypertensive crisis, blood pressure is extremely high and has caused damage to organs. An emergency hypertensive crisis can be associated with life-threatening complications.

Signs and symptoms of a hypertensive crisis that may be life-threatening may include:

- Severe chest pain

- Severe headache, accompanied by confusion and blurred vision
- Nausea and vomiting
- Severe anxiety
- Shortness of breath
- Seizures
- Unresponsiveness

First aid treatment for hypertensive crisis may include hospitalization for treatment with oral or intravenous medications.

- Lay the casualty down and make them comfortable. Do not allow them to walk around.
- Loosen tight clothing around the neck, chest or waist.
- Keep the casualty warm.
- Allow the casualty to take their own medication for decreasing blood pressure if they have it.
- Reassure the casualty. Remove any cause of stress or anxiety if possible
- Call for an ambulance.
- Monitor blood pressure, pulse and levels of response.

Hypoglycemia (Insulin Shock)

Hypoglycemia is a condition in which blood sugar levels are too low to power the body. The symptoms of hypoglycemia will come on suddenly.

Causes

- Lack of food (low glucose)

- Excessive exercise
- Too much insulin
- Vomited meal

Possible signs and symptoms of hypoglycemia (Insulin Shock)

- Pale, cool, clammy
- Dizziness, weakness
- Hunger
- Confusion (like being drunk)
- Strong, rapid pulse (May be normal in some patients)
- Seizures

May be confused with stroke or other cardiac disorders.

First aid treatment for hypoglycemia (Insulin Shock)

If possible, have the victim test the glucose level to correctly identify Hypoglycemia or Hyperglycemia.

- EMS
- Monitor ABCs
- Assist with glucose in any form (candy, juice, Monogel), but only if the victim is fully conscious
- Treat for shock
- Encourage any victim of a diabetic emergency to use their test kit if it is nearby.
- Giving glucose to a victim with insulin shock will help.

- Don't give glucose to an unconscious victim as it can easily become an airway obstruction.

- Some victims carry with them glucagon injections as a rapid treatment for severe insulin shock. The victim should know how to administer it, and should administer it himself.

Practical skills:

1. Checking for airway and breathing
2. Checking for bleeding.
3. Checking for consciousness.
4. Feeling the carotid pulse.
5. Feeling the radial pulse.
6. Feeling the brachial pulse.
7. Feeling the pedal pulse.
8. CPR for adults.
9. CPR for children.
10. CPR for infants.
11. Taking the blood pressure.
12. First aid treatment for heart attack and angina pectoris.
13. First aid treatment for stroke and TIA (transient ischaemic attack).
14. First aid treatment for left ventricular failure.
15. First aid treatment for hypovolaemic shock.
16. First aid treatment for cardiogenic shock.
17. First aid treatment for anaphylactic shock.
18. First aid treatment for fainting.
19. First aid treatment for hypertensive crisis.
20. First aid treatment for hypoglycemia.

Recommended literature:

1. First Aid for Colleges and Universities, Ninth Edition. Keith J. Karren, Brent Q. Hafen, Daniel Limmer, Joseph J. Mistovich
2. Advanced First Aid, CPR, and AED, Sixth Edition. Alton L. Thygerson
Steven M. Thygerson