

Educational material for the First aid class prepared by the Medical Education Centre JFMED based on ERC guidelines

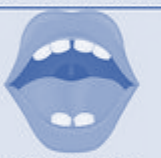
Non-traumatic life-threatening events

Unconsciousness

Definition: loss of one of the vital functions, which is our ability to perceive stimuli and respond to them (unresponsiveness) – unresponsiveness indicates central nervous system dysfunction/damage.

Severity of unconsciousness is assessed via scales (GCS, or AVPU scale).

Glasgow Coma Scale (GCS), a widely used classification, is composed of three parameters: Best Eye Response, Best Verbal Response, and Best Motor Response. The minimal score is 3, the maximal score is 15

Behaviour	Response
 Eye Opening Response	4. Spontaneously 3. To speech 2. To pain 1. No response
 Verbal Response	5. Oriented to time, person and place 4. Confused 3. Inappropriate words 2. Incomprehensible sounds 1. No response
 Motor Response	6. Obeys command 5. Moves to localised pain 4. Flex to withdraw from pain 3. Abnormal flexion 2. Abnormal extension 1. No response

Awake	Patient is awake
Verbal	Patient responds to a verbal stimulus
Pain	Patient responds to a pain stimulus
Unresponsive	Patient is unresponsive to stimulus

Note that the phrase 'GCS of 11' is essentially meaningless, and it is important to break the figure down into its components, such as E3V3M5 = GCS 11.

A Coma Score of 13 or higher correlates with a mild brain injury, 9 to 12 is a moderate injury, and 8 or less a severe brain injury. For layman's assessment, verbal description is the easiest option e.g. spontaneous movements, pupil size, reaction to verbal or tactile command etc.).

Causes:

- CNS disturbances

Injury, Seizures, Stroke (both ischemia and bleeding), Infection (meningitis, encephalitis, abscess), Herniation due to high intracranial pressure (brain oedema, tumours)

- Systemic disturbances

Hypoxia, Loss of homeostasis, Metabolic diseases (diabetes, liver failure, kidney failure, thyroid gland diseases, etc.)

- Environmental factors

Intoxications, Hypoxia, Extreme of temperature (hypo-, hyperthermia)

Signs: absent reaction to verbal command or light shaking, abnormal body position. Do not use painful stimulation in first aid.

First aid: First aid procedures are usually the same irrespective of the cause of unconsciousness (symptomatic approach). Definitive treatment is done after hospital admission. In unconscious victims who have normal breathing and pulse, and there is no probability of head and spine injury, nor have other contraindications like fracture of pelvis, long bones, spinal cord, shoulder injury, and open abdominal injury, use the stabilized or recovery position. Prevent hypothermia and pressure sores, monitor vital functions.

Before EMS arrives, obtain history from bystanders or family members (history of stroke, diabetes, previous surgery, drugs, ampoules, etc.)

REMEMBER: Clear signs of alcohol intoxication do not exclude head or brain injury!

Hypo/hyperglycaemia

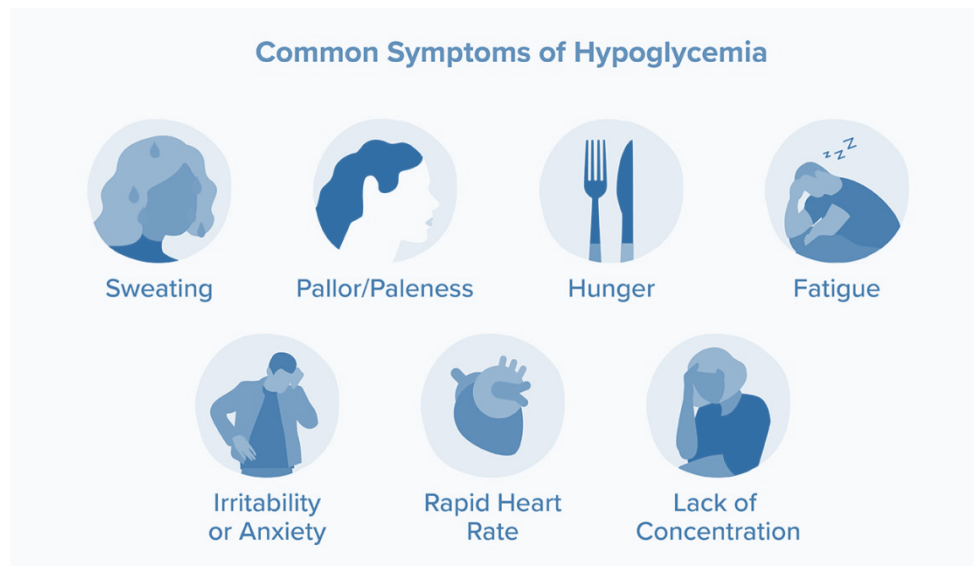
A healthy individual regulates the physiological level of BLG (blood glucose level), and glucose is the main source of energy for neurons. The lack of glucose (drop of BGL) below physiological value – known as hypoglycaemia leads to activation of the sympathetic system first as a warning, and later leads to neurological manifestation, eventually leading to unconsciousness. So does hyperglycaemia – very high BGL, which influences neurons via osmotic forces. Hyperglycaemia induces hyperosmolality of the plasma with the water flowing out of the cells, resulting to cellular dehydration. Both conditions – low and high BGL are complications of diabetes.

Hypoglycaemia

Definition: Loss of consciousness caused by the low BGL.

History: diabetes treated by insulin, omitting food after high dose of insulin or strenuous exercise,

Signs and symptoms: pale skin colour, sweating, tachycardia, hunger, rapidly changing state of consciousness, starting from nausea, blurred vision, restlessness to abnormal behaviour, aggressiveness, and unconsciousness



First aid: in conscious patients – administer the source of glucose (sugar, sweets, sweet cola (not cola light) offer proper food after fast sugar, in disturbed consciousness or unconsciousness, do not give anything to eat or drink

- call EMS
- standard care for unconscious -ABCDE
- unconscious casualty who is breathing – recovery position

Some diabetics are equipped with an autoinjector with glucagon – a hormone that releases glucose from the liver. You must follow the instructions on how to use it. The kit consists of a syringe containing the diluent and a bottle containing the medicine. Insert the needle into the bottle and push the liquid in. Remove the syringe and gently shake the bottle until the liquid becomes clear. Insert the syringe back into the bottle, and withdraw the medicine. Apply subcutaneously or intramuscularly

Hyperglycaemia

Hyperglycaemia is a condition where blood glucose (sugar) levels are too high. It commonly occurs in people with diabetes, especially if insulin or medication is missed, during illness, stress, or after eating too many carbohydrates. Glucose is an osmotically active substance, therefore, it increases the osmolality of body fluids. The signs and symptoms are consequences of hyperosmolality.

Signs and symptoms are: Increased thirst and dry mouth, frequent urination, Fatigue and weakness, blurred vision, headache, nausea or vomiting, fruity-smelling breath (in severe cases), confusion or drowsiness (if untreated)

First aid:

1. Check if the person has diabetes and if they have their glucose monitor or insulin.
2. Encourage the person to check their blood sugar level if possible.
3. If blood sugar is consistently high (e.g. > 13.9 mmol/L or > 250 mg/dL):
 - Do not give sugar or food.
 - Do not give insulin unless the person is trained to self-administer.
4. Encourage hydration with water (unless vomiting).

5. Monitor symptoms – if the person becomes confused, very sleepy, or vomits repeatedly, call emergency services immediately.
6. If unconscious, place the person in the recovery position and monitor breathing.

Collapse (fainting)

Definition: Syncope (fainting) is a short loss of consciousness and muscle strength, characterised by a fast onset, short duration, and spontaneous recovery.

Causes: decrease in blood flow to the brain usually from low blood pressure. There are multiple classifications based on the underlying cause of the syncope; however, cardiogenic syncope (caused by sudden heart block, arrhythmia or structural heart problem e.g. aortic stenosis) is a serious condition, because it indicates sudden loss or significant reduction of cardiac output and may require even pacemaker (for arrhythmia) or surgery (for Ao stenosis) as a definitive treatment. Then, there is an “innocent” syncope which is caused by reflex mechanisms, or hypotension due to various reasons – these two categories – cardiogenic and non-cardiogenic syncope must be distinguished.

Vasovagal (situational) syncope is one of the most common types, which may occur in response to any of a variety of triggers, such as scary, embarrassing, or uneasy situations, during blood drawing, or moments of sudden, unusually high stress.

Orthostatic (postural) hypotensive faints are as common or perhaps even more common than vasovagal syncope. Orthostatic faints are most often associated with movement from lying or sitting to a standing position, standing up too quickly, or being in a very hot room.

Other causes are fasting, exercise, abdominal straining, or circumstances promoting vasodilation (e.g., heat, alcohol, antihypertensive medications)

Prodromal symptoms: Some people have prodromal symptoms before loss of consciousness occurs. These symptoms may include lightheadedness, sweating, pale skin, blurred vision, nausea, vomiting, and feeling warm, among others. Syncope may also be associated with a short episode of muscle twitching.

Signs and symptoms: Short loss of consciousness and muscle strength, characterised by a fast onset, short duration, and spontaneous recovery. Many people may report symptoms of syncope, but to determine true loss of consciousness, a prudent question in anamnesis would be: “Do you remember hitting the ground when you fell?”



First aid:

- During prodromal symptoms – positioning the person on the ground, with legs slightly elevated or leaning forward and the head between the knees for at least 10–15 minutes, preferably in a cool and quiet place.
- After fall – anti-shock position (elevated legs) check vital functions, apply a cold wrap to the forehead
- After the symptoms have passed, rest and recommend that the patient sip water.
- If fainting spells occur often without a triggering event, syncope may be a sign of an underlying heart disease and needs medical examination.
- If unconsciousness continues, put the patient in to recovery position and treat as other unconsciousness
- Call EMS if a victim remains unconscious, if he has other problems like difficulty speaking, loss of vision, weakness or paralysis of one side of the body, headache, seizures, etc.

Asthmatic attack

Definition: Asthma is a chronic inflammatory disease of the airways characterized by variable and recurring symptoms, reversible airflow obstruction, and bronchospasm. Common symptoms include

wheezing, coughing, chest tightness, and shortness of breath. An asthmatic attack is a sudden worsening of the patient's previous state

Causes: usually allergy, infection, air pollution exposure, sometimes psychogenic causes may trigger an asthma attack

Signs and symptoms: anything from mild worsening to a life-threatening situation, typically characterized by severe wheezing when breathing both in and out, coughing, tachypnea, chest tightness or pressure, difficulty talking, feelings of anxiety or panic, sweating, and blue lips or fingernails.

REMEMBER: Sudden silence is not a sign of improvement, and decreased respiratory rate and bradycardia are signs of imminent cardiac arrest.

First aid:

- Sit the person upright and reassure them about your assistance, stay calm
- Loosen tight clothing, open the window, and get some fresh air for the casualty
- Give four puffs of reliever (bronchodilator) drug (one puff to the spacer and 4 inhalations from the spacer, repeat until 4 puffs are completed)
- Wait 4 minutes and if there is no improvement, give 4 more separate puffs of reliever
- Call EMS and keep giving 4 separate puffs of reliever every 4 min until EMS arrive

Status asthmaticus is a long-lasting and severe asthma attack that does not respond to standard treatment. Asthma symptoms continue and respiratory function declines, despite standard treatments, which can lead to respiratory failure, prolonged hospitalization, and even death, and requires immediate and aggressive treatment

Chest pain

Chest pain is a frequent reason for prehospital EMS interventions. Any thoracic or abdominal organ can be affected. To determine the cause of the pain, we must consider the patient's medical history and current complaints, particularly the nature of the pain. Questions that must be asked to assess the situation are:

- o circumstances, when and how problems appeared
- o localisation of pain
- o character of pain
- o duration of pain
- o other symptoms (vomiting, nausea, sweating)

SOCRATES – site, onset, character, radiation, additional symptoms, time/duration, exaggerating /alleviating factors, severity)

Pathological processes that cause chest pain and must be taken into consideration! Remember, in case of chest pain, always think of myocardial infarction rather than neglecting a condition that

may easily deteriorate and require CPR, as it may lead to arrest. Each case of chest pain must be evaluated with caution.

Acute ischemic heart disease (myocardial infarction)

- Intense retrosternal pain or retrosternal pressure sensation that also may be characterised as squeezing, aching, burning, or even sharp and often radiates up to the neck, shoulder, and jaw and down to the ulnar aspect of the left arm
- Nausea and/or vomiting
- Cold sweats
- Restlessness
- Influence of stress, weather changes, temperature, etc.
- History of previous chronic ischemic heart disease

Vertebrogenic pain (pain “from spine”)

- Chronic problems with the spine
- Long-lasting or cyclic pain (hours, days)
- Localised character (patient can find the trigger point to provoke pain)
- Some relief position
- No history of cardiac diseases

Pulmonary diseases

- Pain originates in pleura
- Inflammations, tumours
- Signs and symptoms of infection – dyspnoea, fever, cough, exhaustion
- Intensity of pain depends on chest movements
- Pathological lung sounds: wheezing, crackles, pleural rubs
- Sometimes a combination of pulmonary and cardiogenic aetiology

Gastroesophageal reflux (GERD)

- History of repeated episodes of the “heartburn” when the refluxate reaches the oesophagus
 - Heavy meal, vomiting

Neurasthenia

- Usually localised sharp pain between ribs
- Young people (stress)
- Hyperventilation

Posttraumatic pain

- History of trauma
- Localized pain
- Pain during palpation
- Usually worse during inspiration

Aortic dissection

- Similar to myocardial infarction
- Sudden severe chest or upper back pain, often described as a tearing, ripping, or shearing sensation, that radiates to the neck or down the back. The textbook presentation is between the shoulder blades.
- History of hypertension, ischemic heart disease, age over 55
- Could cause loss of consciousness, shortness of breath, sudden difficulty speaking, loss of vision, weakness, or paralysis of one side of your body, similar to those of a stroke, weak pulse in one arm compared with the other etc.

Pulmonary embolism

- Dyspnoea, chest pain, tachycardia, tachypnoea, hypoxia, cyanosis
- Dilated neck veins, cardiogenic (obstructive shock)
- History of long immobilisation, dehydration, cancer, contraceptive pills, surgery in recent history

Tension pneumothorax

- Significant dyspnoea
- Fainting
- Dilated neck veins
- Sometimes subcutaneous air that feels like a crepitation under the skin
- Loss of breath sounds and hollow sounds during chest percussion

- Delay of one side of the chest movement in inspiration

Myocardial infarction

Definition: Myocardial Infarction (heart attack) is the irreversible necrosis of heart muscle secondary to prolonged ischemia

Causes: Usually obstruction of one or more coronary arteries by an atheroma, less frequently by thrombosis, embolus (blood clot, piece of atheroma plaque), arterial spasm, serious systemic hypotension, carbon monoxide intoxication etc.

History:

sudden pain, usually during periods of normal household activity (70%) and at rest (45%) or light exertion (30 %). The patient could already have some preexisting cardiac disease or hypertension.

Signs and symptoms:

- Fatigue
- Chest discomfort
- Malaise

Typical chest pain in acute myocardial infarction has the following characteristics:

- Intense and unremitting for 20-60 minutes
- Retrosternal and often radiates up to the neck, shoulder, and jaw, and down to the ulnar aspect of the left arm
- Usually described as a retrosternal pressure sensation that also may be characterised as squeezing, aching, burning, or even sharp.
- In some patients, the symptom is epigastric, with a feeling of indigestion or of fullness and gas
- Unusual, but still possible, is that the patient has no sensation of pain at all – this is most common in long-standing diabetes mellitus.

The patient's vital signs may demonstrate the following in myocardial infarction:

- The patient's heart rate is often increased secondary to sympathoadrenal discharge
- The pulse may be irregular
- The respiratory rate may be increased in response to pulmonary congestion or anxiety
- Intensive sweating
- Frequent nausea or vomiting
- Intensive fear of death

First aid:

- Call EMS
- Have the person sit down, rest, and try to keep calm.
- Let them chew and swallow an Aspirin
- If the patient does not faint, keep him in any comfortable position (usually sitting or semi-sitting).
- Ask if the person takes any chest pain medication, such as nitroglycerin, for a known heart condition, and help them take it.
- Prepare to resuscitate at any time an arrest occurs

Further therapy: (even though we have the First aid class – we want you to understand that this story continues in the hospital)

Morbidity and mortality from myocardial infarction are significantly reduced if patients and bystanders recognise symptoms early, activate the emergency medical service (EMS) system, and thereby shorten the time to definitive treatment. Trained prehospital personnel can provide life-saving interventions if the patient develops cardiac arrest. The key to improved survival is the availability of early defibrillation. As a general rule, initial therapy for acute myocardial infarction is directed toward restoration of perfusion as soon as possible to save as much of the jeopardised myocardium as possible. This may be accomplished through medical or mechanical means, such as removal of the clot from the coronary artery in the cath lab - thrombolysis, angioplasty, or coronary artery bypass graft surgery are the final solutions to this problem.

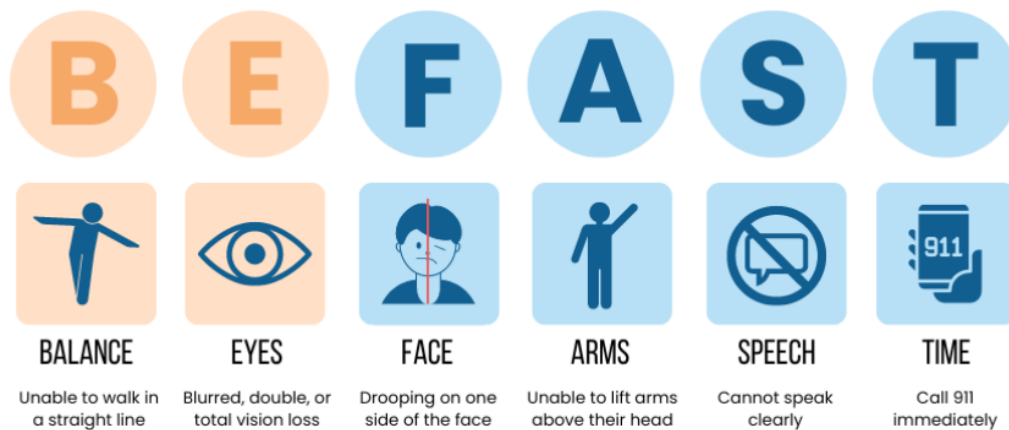
Stroke

Cause: Local loss of supply of oxygenated blood. The cause is either the obturation of a blood vessel (ischaemic brain infarct – 80 %) or rupture of a blood vessel – intracerebral bleeding.

History and Signs and symptoms are variable depending on area involved: inability to move or feel on one side of the body, asymmetric face (drop of eyelid, one side of mouth), problems understanding or speaking, dizziness or instability, loss of vision to one side, headache etc.

First aid: Call EMS immediately, control vital functions, in case of lost consciousness, treat as an unconscious patient (see above).

BE FAST



BEFAST is an acronym used to quickly identify the signs of a stroke and take immediate action. It stands for:

- **Balance:** Sudden loss of balance or coordination.
- **Eyes:** Sudden vision changes or blurred vision.
- **Face:** Facial drooping or uneven smile.
- **Arms:** Weakness or numbness in one arm, inability to lift both arms equally.
- **Speech:** Slurred or difficult speech.
- **Time:** Time to call emergency services if any of these symptoms are observed.

This protocol is crucial for early detection and rapid intervention in stroke cases to minimize damage and improve patient outcomes.

Seizures

Definition: uncoordinated muscle contractions.

Classification:

- peripheral – muscular problem (metabolism of calcium – tetany, malignant hyperthermia, hypoxia and acidosis – muscle spasms during and after exercise, ischaemic leg disease)
- central – CNS disturbance (epilepsy, febrile seizures, eclampsia, rarely ischaemia, infections, tumours)

Beside epilepsy, the most common causes of seizures are brain injury, cerebrovascular disease, Hypoxemia of any cause, central nervous system infections, metabolic and toxic conditions (hyponatremia, hypoglycemia, hyperglycemia, renal failure, liver failure...), fever, Extremely high blood pressure, brain tumor, drug and alcohol abuse/withdrawal, allergies

Tetany

Cause: Hyperventilation (e.g., caused by panic attack) resulting in the decrease of the partial pressure of carbon dioxide in blood, decreased plasma level of ionised calcium resulting in increased neuromuscular irritability.

History and Signs and symptoms: Panic attacks can cause sweating, palpitations, trembling, and difficulty breathing. Other signs are hyperreflexia – overactive neurological reflexes, carpopedal spasm – spasms of the hands and feet, spasm of facial muscles, cramps, laryngospasm, tingling finger tips, lips, tongue etc.

First aid: Calm the person down and let them breathe from the paper bag

Epilepsy

Causes: irritation of the central nervous system of various origins. There are many types, the best known is grand mal. Absence is typical for children – a child suddenly stops their activity for a while and they look stuck in the middle of their activity. Amnesia is typical for both forms.

History and signs and symptoms: Epilepsy is a chronic disease; common triggers of seizures include tiredness, stress, alcohol, and not taking medication. Prodromal symptoms are present in some people, so they recognise the coming attack. In others, the seizures come without warning. An epileptic seizure starts with sudden unconsciousness, a fall, tonic seizures followed by tonic and clonic seizures, often with passing urine and/or stool. Seizures last usually 2 – 3 min, followed by sleep, confusion, and finally full recovery.

First aid:

1. Stay calm.
2. Look around – is the person in a dangerous place? If not, don't move them. Move objects like furniture away from them.
3. Note the time the seizures start.
4. Stay with them. If they don't collapse but seem blank or confused, gently guide them away from any danger. Speak quietly and calmly.
5. Cushion their head with something soft if they have collapsed to the ground.
6. Don't hold them down.
7. Don't put anything in their mouth.
8. Check the time again. If a seizure doesn't stop after 5 minutes, call for an ambulance.
9. After the seizure has stopped, put them in the recovery position and check if their breathing is returning to normal. Gently check their mouth to see that nothing is blocking their airway, such as food or false teeth. If they are having problems breathing after the seizure has stopped, call for an ambulance.
10. Stay with them until they have fully recovered.

Call EMS if:

- it is the first attack

- if unconsciousness lasts for a long period
- convulsions last too long or the attack is different from the previous ones
- an epileptic attack resulted in an injury that must be treated