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First aid for traumatic life-threatening conditions

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Table of Contents



Bleeding

Shock and anti-shock
measures

Bone, joint and muscle
injuries

Spinal injuries

Burns

Bleeding

"I don't like the sight of blood either. That's why if it's flowing where it shouldn't, I stop the bleeding. "

(V.Dobias)

Life-threatening conditions: cardiac arrest
respiratory arrest
Bleeding
unconsciousness
Shock

Bleeding

Blood loss from the vasculature due to damage/breach of the vessel wall

Violation of the vascular wall: mechanical factor
chemical factor
erosion (invasion)

Bleeding: external
internal
mixed

arterial
venous
capillary

- Blood volume in the body: 65-75 ml/kg body weight
 - 70 kg person - 5 l of circulating blood
 - 80 kg person - 6 l of circulating blood
 - 15 kg child - 1 l of circulating blood
- Clinical signs when approximately 15% of the circulating blood volume is lost
- As a result of massive bleeding, **hemorrhagic (hypovolemic) shock** develops

Definition of severe bleeding

Severe bleeding	• symptomatic bleeding into a critical area or organ, compartment syndrome (intracranial, intraspinal, retroperitoneal, intra-articular, pericardial) • a drop in haemoglobin of 20g/l or more, requiring the administration of two or more units of whole blood or erythrocytes
Life-threatening bleeding	• loss of whole blood volume (approx. 60 ml/kg body weight) within 24 hours (approx. 10 erythrocyte units) • 50% blood loss within 3 hours • continued loss within 20 minutes • loss leading to compromise of essential life functions (e.g. bleeding into the central nervous system)
Unstoppable bleeding	• shock with clinical and laboratory signs of hypoperfusion, hypocoagulable state and failure of standard procedures to stop bleeding (surgical control to stop bleeding, administration of erythrocytes, plasma, fibrinogen and thrombocyte concentrates)

Estimation of blood loss in fractures

humerus 800 ml

tibia + fibula 1000 ml

femur 1500 ml

pelvis 3000 ml

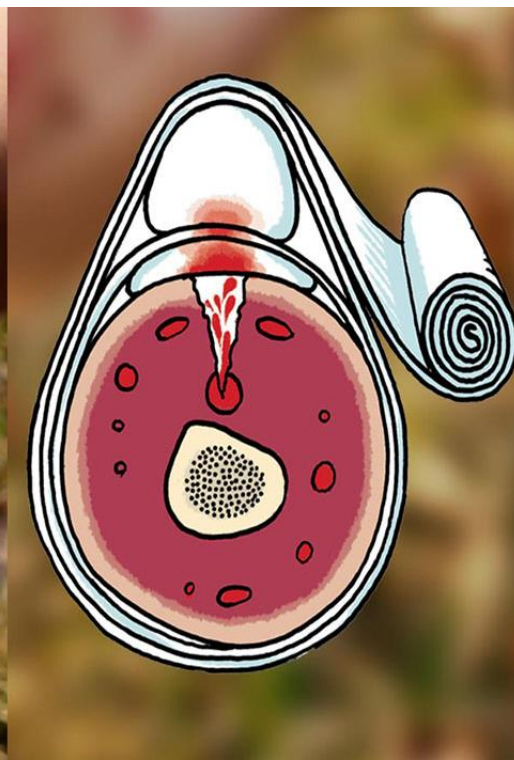
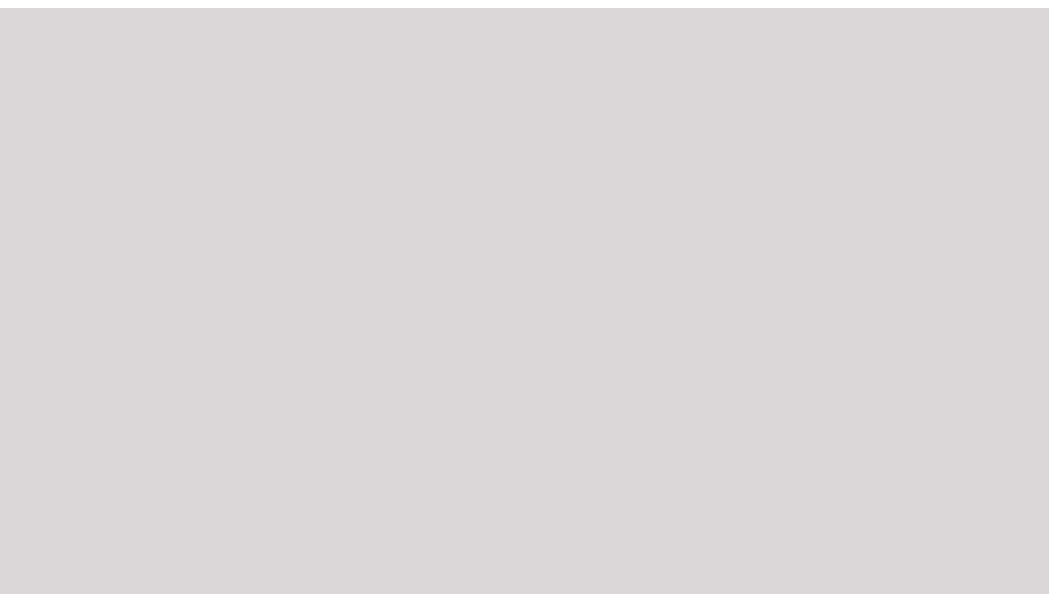
Estimation of external bleeding is up to 50% inaccurate

American College of Surgeons Classes of Acute Hemorrhage

Factors	I	II	III	IV
Blood loss	<15% (<750ml)	15-30% (750-1500ml)	30-40% (1500-2000ml)	>40% (>2000ml)
Pulse	>100	>100	>120	>140
B.P.	Normal	Normal	↓	↓↓
Pulse pressure	N or ↓	↓	↓↓	↓↓
Capillary refill	<2s	2-3s	3-4s	>5s
Resp. rate	14-20	20-30	30-40	>40
Urine output ml/hr	30 or more	20-30	5-10	Negligible
Mental status	Slightly anxious	Mildly anxious	Anxious & confused	Confused Lethargic

Bleeding - first aid

- **PRESSURE to the wound** - fingers, palm/palms
 - pressing against the bone/edges of the wound together/deep
 - min. 10 minutes
- Pressure dressing
- Cleaning and disinfection of the wound
- Anti-shock measures





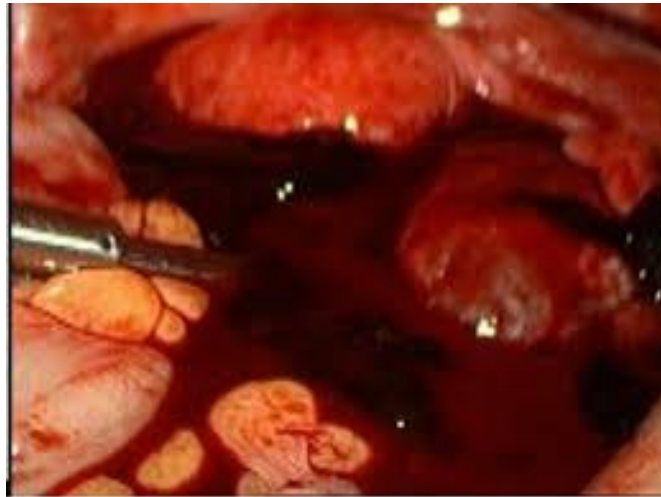
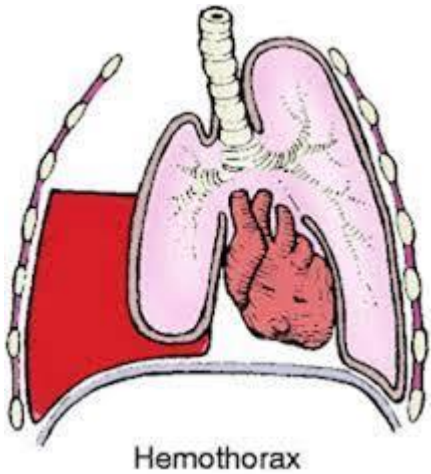


Internal bleeding

- Bleeding into a body cavity (skull, chest, abdomen) or into hollow organs (stomach, intestine, bladder...)
- Often hidden
- Diagnosis often based only on assumptions based on mechanism of injury:
 - blunt abdominal/thoracic injuries
 - penetrating injury of the abdominal/thoracic cavity
 - head injuries
- Symptoms: +/- pain, pallor, sweating, apathy, rapid and weak pulse
 - intracranial haemorrhage - impaired consciousness,
 - different pupil size - anisocoria

Internal bleeding - first aid

- Call 155/112
- Recumbent position
- Anti-shock measures
- Monitoring of the affected person: pulse, respiration, consciousness



Nosebleeds - first aid



- Squeeze the nose wings (10 minutes)
- Bow
- Reassure
- After the bleeding stops - 2 hours of not eating, not drinking hot drinks and foods, body rest

Foreign body in the wound



- **Never pull out a foreign body !!!!!**
- Fix it with your hands, pushing the edges of the wound together and into the depth
- If possible, dress it with bandages, cover the wound with a simple bandage so as not to press the body in the wound
- Call for help- 155/112
- Calm the affected person and control vital functions



Amputations

- Treat the wound and stop the bleeding
- Look for the amputated part
- Wrap the amputated part in gauze and place it in a plastic bag/container
- Place the bag with the amputated part in a container/bag filled with ice water
- Call for help 155/112
- Label the bag with the name of the person affected and the time of the accident

Shock and anti-shock measures

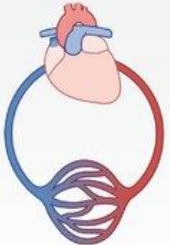
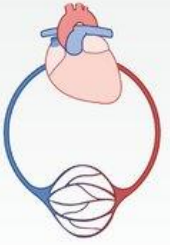
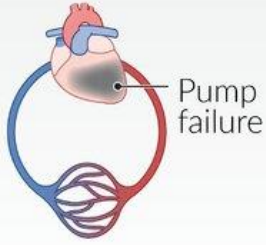
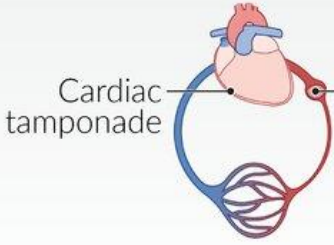
Shock: acute/subacute change in **microcirculation and macrocirculation**

circulation manifested by **reduced blood supply to organs**, deoxygenation of cells and accumulation of toxic metabolic products.

- The result is **impaired cell function and cell metabolism**, which without treatment leads to **irreversible organ damage** (CNS, heart, kidney, lung, liver)



Classification of Shock

Volume				Output			
Shift Distributive shock		Loss Hypovolemic shock		Cardiac Cardiogenic shock		Extracardiac Obstructive shock	
Septic	Capillary leakage	Hemorrhagic (traumatic or nontraumatic)	Blood (whole)	Myocardial causes	Myocardium	Impaired diastolic filling	E.g., cardiac tamponade
Anaphylactic Anaphylactoid Neurogenic	Vascular tone dysregulation	Nonhemorrhagic (nontraumatic)	Body fluids (e.g., GI loss)	Arrhythmias	Conduction system	↑ Ventricular afterload	E.g., massive PE
		Nonhemorrhagic (traumatic)	Plasma (e.g., from burns)	Valvular heart disease		Obstruction of venous return	E.g., tension pneumothorax
 Vasodilation		 Hypovolemia		 Pump failure		 Cardiac tamponade Obstruction	

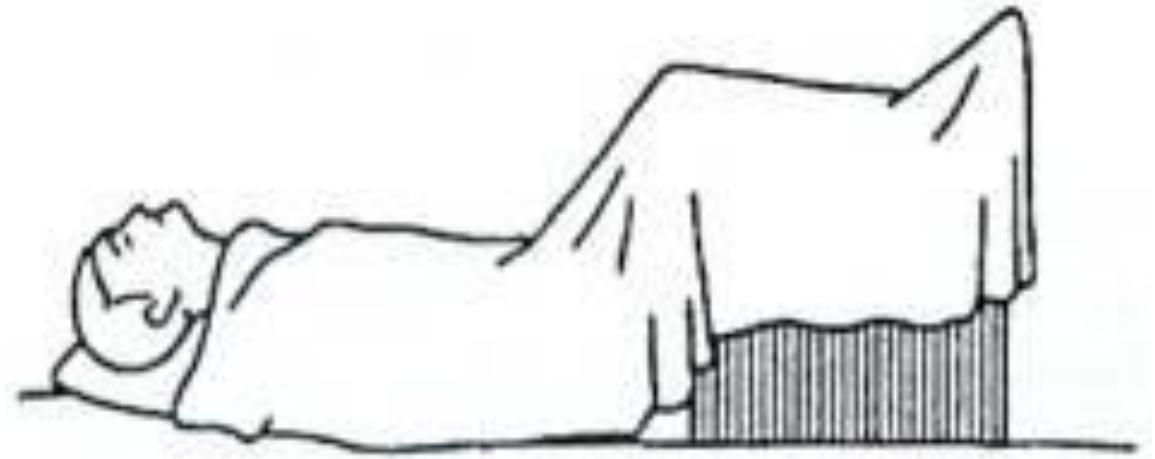
Shock - symptoms

- CNS: deterioration of the state of consciousness- apathy, somnolence, unconsciousness, or agitation, aggressiveness
- CVS: prolonged capillary return, pulse - accelerated, less palpable, skin cold, sweaty, marbling present, cold extremities
- Breathing: rapid, shallow
- GIT: nausea, vomiting, dry mucous membranes, thirst

Shock - first aid

1. **HEAT** - COVER - prevent heat loss (thermofoil/blanket/clothing)
2. **SILENCE** - COMFORT, position
3. **LIQUIDS** - DO NOT DRINK or EAT (moisten lips with a damp cloth)
4. **PAIN MANAGEMENT** - TREAT wounds, immobilize fractures, soothe, explain
5. **TRANSPORT** - DOCTOR - 155/112, anti-shock position

Start taking action as soon as possible!!!



Anti-shock position

Bone, joint and muscle injuries

I always think of injuries to bones, joints, muscles if:

1. accident/violent act
2. sudden pain
3. malfunction

Symptoms: soreness, limitation to complete inability to move, swelling, hematoma

"confirming" symptoms - deformity, unnatural movement, crepitations, visible bone

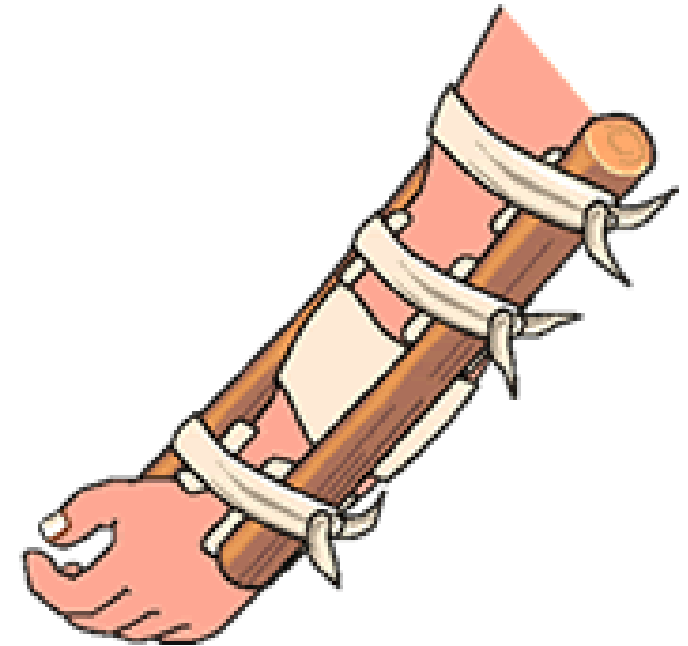
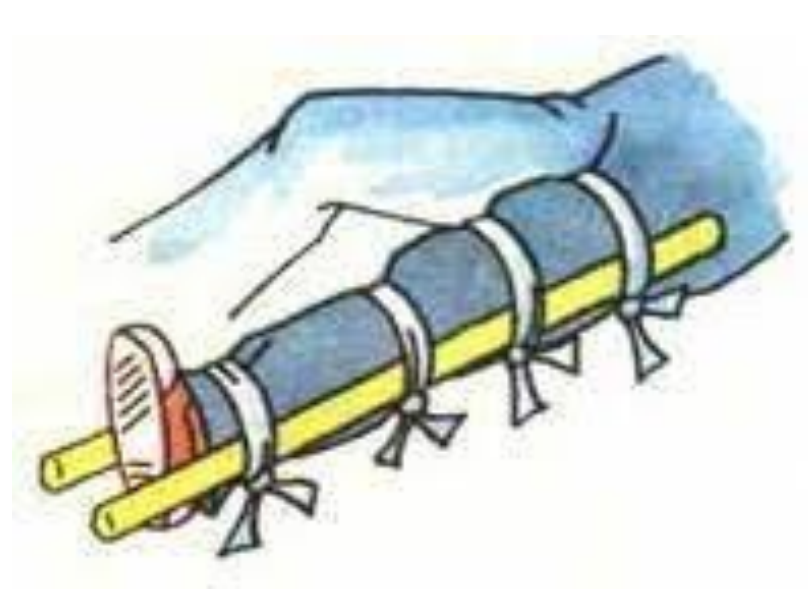
Bone, joint and muscle injuries - first aid

FIXATION

- Always 1 joint above and 1 joint below the site of greatest soreness
- The improvised splint must extend at least 15 cm over the joints

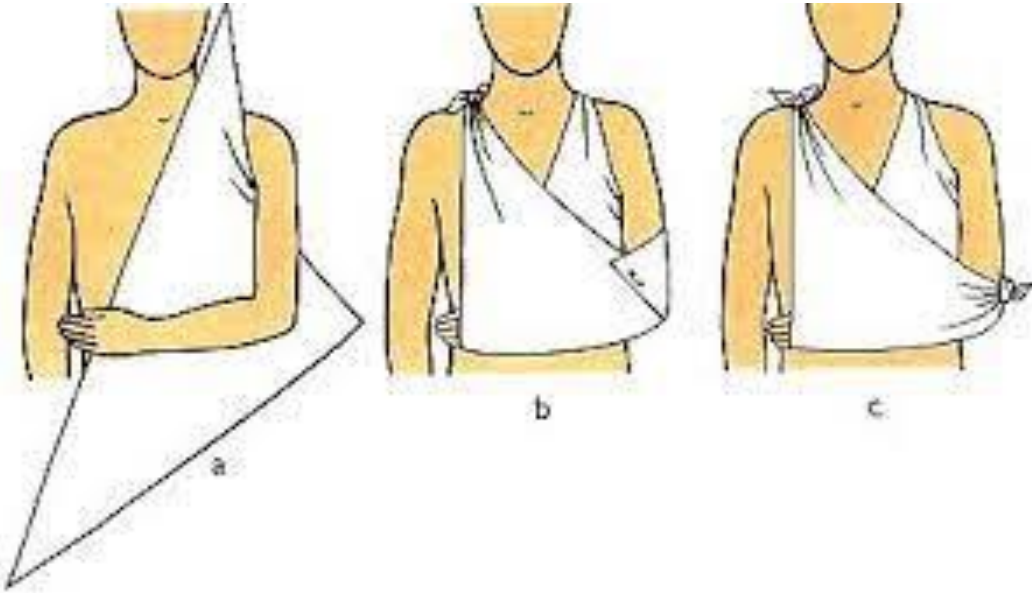
ANTI-SHOCK MEASURES

CHECK THE PULSE ON THE ARTERY BELOW THE INJURED AREA



Upper limb immobilisation

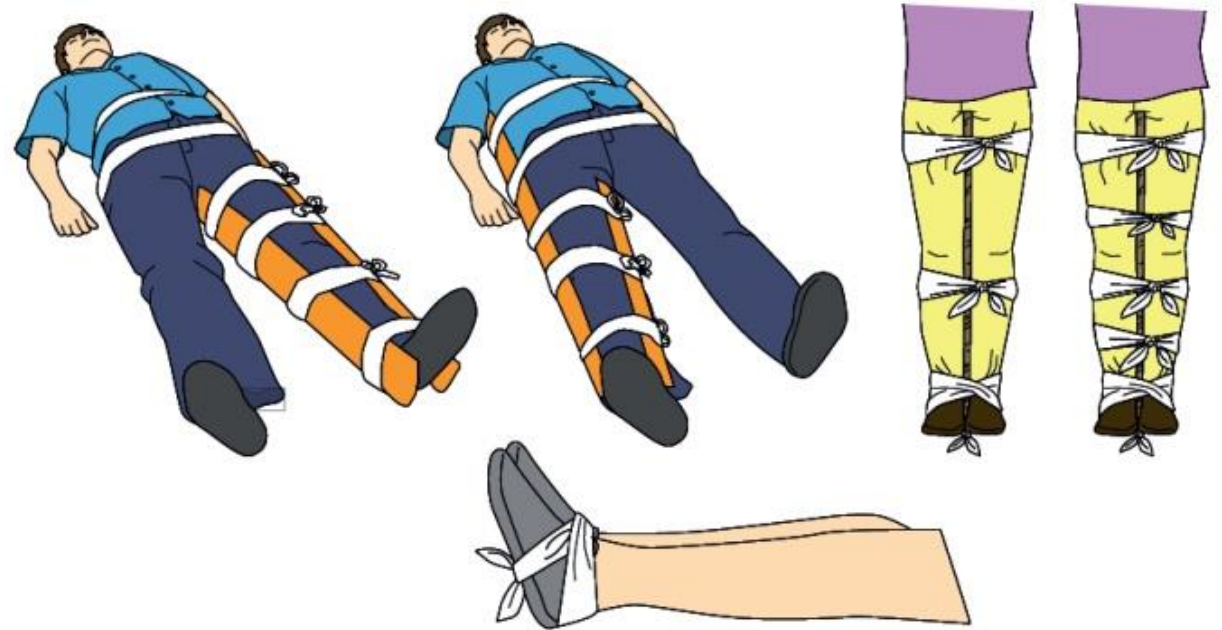
- Supporting the injured limb with the hand
- Clothing
- Three-cornered scarf/scarves



Lower limb immobilisation

- Tie the healthy lower limb to the affected one
- If limb deformity, immobilize with padding (blanket, coat, bag...whatever is available)
- Immediately anti-shock measures

CAVE: femur fracture - major blood loss



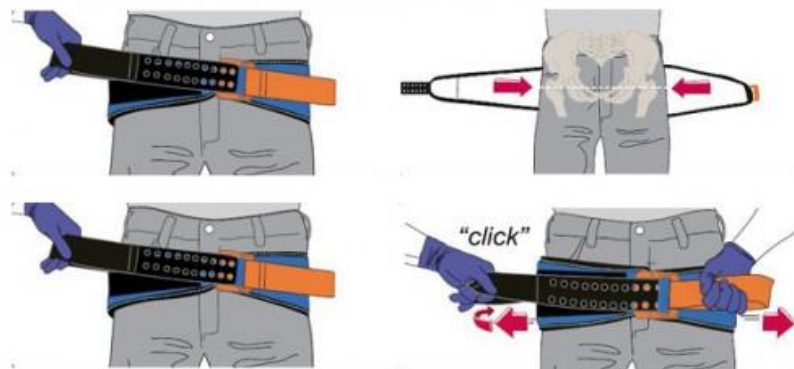
Fracture of the pelvis

Caution - major bleeding. Life threatening.

- to be assumed for: falls from a height of more than 3 m
 - pedestrian-car collision
 - unrestrained children in the car
- the injured person is unable to squeeze the rescuer's fist inserted between the casualty's knees

Immobilization: - retract the pelvis with a sheet/blanket folded to a width of approx. 30-40 cm and fix

- pelvic fixator



Pelvic fixator



Open fractures

- prevent blood loss
 - prevent movement
 - prevent infection
-
- cover the wound with sterile material
 - stop bleeding (pressure)
 - immobilise the limb
 - anti-shock measures
 - transport to the hospital

Risks of fractures

- Injury to blood vessels and nerves - checking the pulse on the artery below the fracture, checking the temperature of the extremities of the body, checking the sensitivity
- Bleeding: humerus - approx. 800 ml
 - femur - 1500 ml
 - pelvis - 3000 ml
 - rib - 150 ml
- Embolism - blood clot/fat embolism
- Pseudo-articular healing

Polytrauma

Polytrauma - injury to multiple body parts or multiple organ systems, at least one of which is life-threatening to the patient

Etiology:

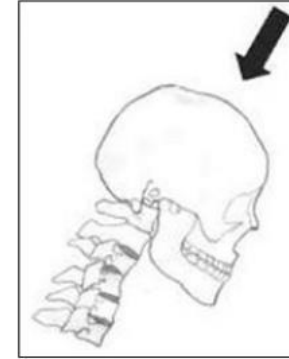
- Traffic accidents - 32-40% of deaths and injuries
- Assault - 20% of injuries
- Injuries caused by inanimate forces - 16 %,
- Environmental influences - 12% (hypothermia, overheating, electric shocks).
- Fires and explosions - 3% (burns, circulatory arrest).
- Falls - 10%

About 5-15% of patients who have normal vital signs and normal findings on initial examination have severe injuries that are only revealed later on repeated examinations.

Therefore, any person exposed to the strong forces must be considered injured until proven otherwise.

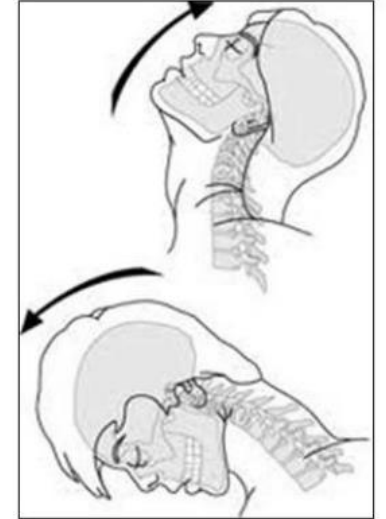
Causes:

- High-velocity RTAs
- Falls from a height
- Sports injuries
- Occupational injuries



Mechanisms:

- Whip-Lash Injury
- (Flexion-Extension Injury)
- Axial Compression Injury



Polytrauma - first aid

1. Mechanism of injury - the assumption of injury
2. Medical history - **accident** casualty/witnesses
3. Initial examination
4. Secondary examination

Initial examination: the **AcBCDE procedure**

AcBCDE procedure

A c - airway and cervical spine - checking DC patency, DC clearance

- immobilization of the neck and head in suspected C-spine injury

B - breathing - presence, frequency, depth, air in the subcutaneous tissue, unstable chest

C - circulation and bleeding - stop external bleeding, assume internal bleeding

- pulse control, capillary return, anti-shock position

D - CNS control - state of consciousness(somnolence, sopor, coma, GCS)

- orientation neurological examination (pupil size, reactions to lighting, movement, and sensitivity of the limbs

E - exposure - examine the affected person, look for other injuries

- prevent hypothermia

In the first minutes after injury, about 50% of those affected die as a result of severe brain damage and injury to large blood vessels.

During the so-called "golden hour", about 30% of those affected die as a result of intracranial haemorrhage, severe chest and abdominal trauma

Within days and weeks, about 20% of those affected die of multiorgan failure as a result of shock.

Injuries of the spine and spinal cord

Spinal injury - damage to one or more vertebrae (luxation, fracture of the body or arch, or a combination of luxation and fracture), damage to ligaments and fixation muscle apparatus

Spinal cord injury is damage to the spinal cord of the CNS by traumatic mechanisms (fractures, penetrating injuries by bone fragments, stab and gunshot wounds) alone or together with spinal cord injury

Spinal shock - a transient physiological depression of sensory and motor functions associated with impaired autonomic innervation immediately after injury.

Neurogenic shock - characterized by the hemodynamic triad: hypotension, bradycardia, peripheral vasodilation from interruption of sympathetic innervation

Approximately 20 patients per 100,000 population per year, of which about a quarter are with complete lesions.

Up to 80% are aged 18-35 years, and there are 2.5-3 times more men than women.

Transport accounts for 55% of spinal injuries, about 30% in industry, and 15% in sport

Diagnostics:

- **Vertebral fracture** - only an **assumption** based on the mechanism of injury
- **Spinal cord injury** - **numbness**, reduced to **absent sensitivity**
 - reduced to absent **mobility** below the site of damage

"I can't feel my legs!"

The most vulnerable part of the spine is the C-spine!

By the mechanism of injury, assume spinal cord damage, seek protection!

Spinal cord injury in C area - possible breathing disorders depending on the height of the injury!! (C5)

High risk of spinal injury when :

- impacts at speeds above 60 km/h
- falls from a height greater than body height



- **hyperflexion and extension of the neck** (blow to the head during boxing, occupant in a stationary vehicle during rear impact, major blunt trauma above the level of the clavicle, drowning after jumping into water)
- **motorcycle accidents**
- **a car hitting a pedestrian or cyclist**
- disabled in rollover, ejection, front axle displacement, cab deformation and fatal single occupant accidents

Spinal and spinal cord injuries - first aid

IMMOBILISATION of the entire spine

If possible, DO NOT move or transfer

AIRWAY and BREATHING CONTROL

Anti-shock measures

Call for HELP - 155/112

CONTROL of consciousness, breathing, pulse



Burns and scalds

- injuries caused by high temperatures or corrosives
- "dry" - flame, hot bodies, friction burns, electric current, lightning, ionizing radiation
- "wet" – steaming/boiling water injury
- "chemical" - acids and bases

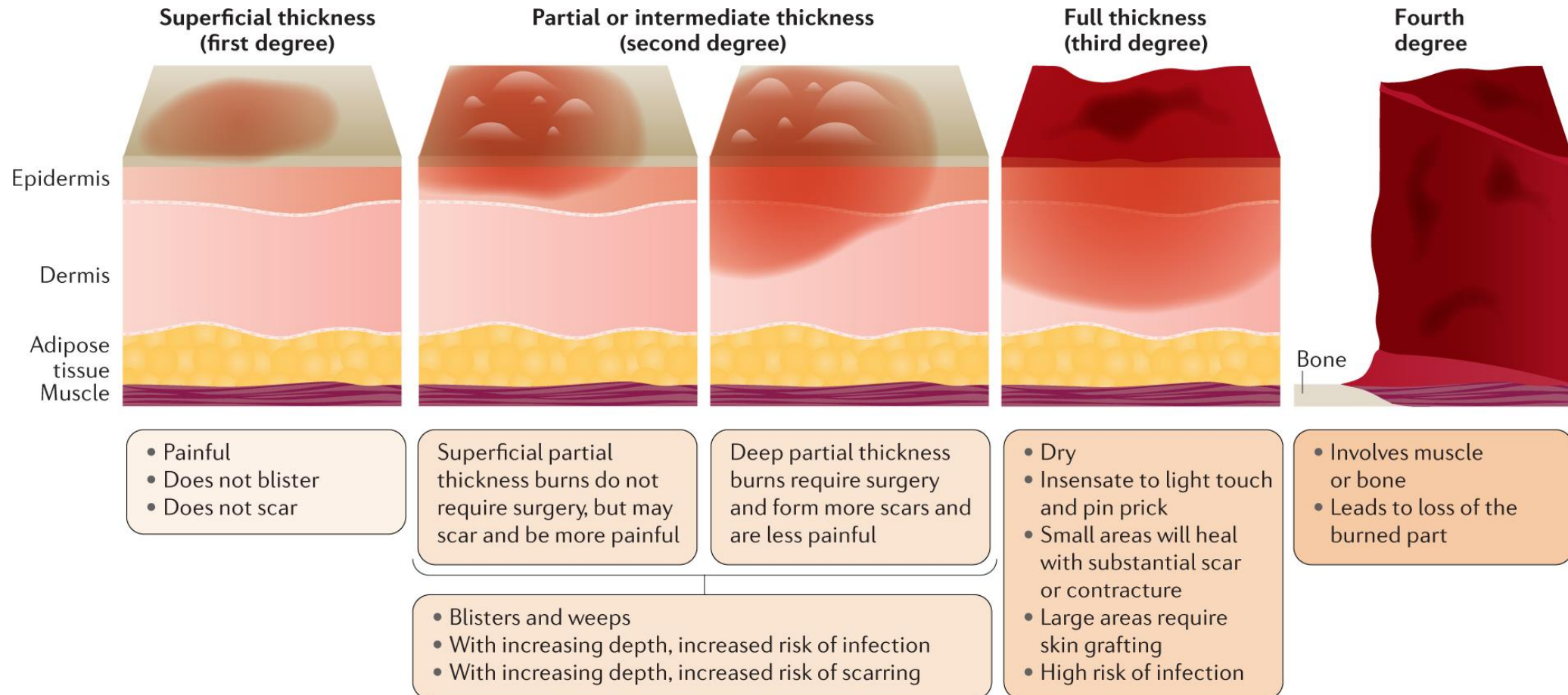
1st degree burns - redness

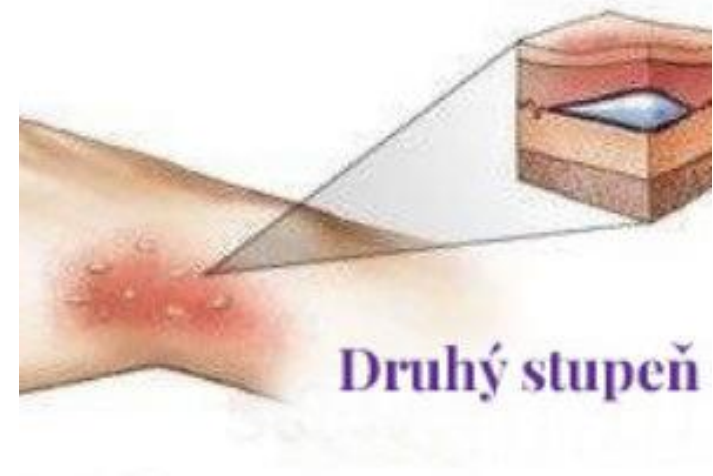
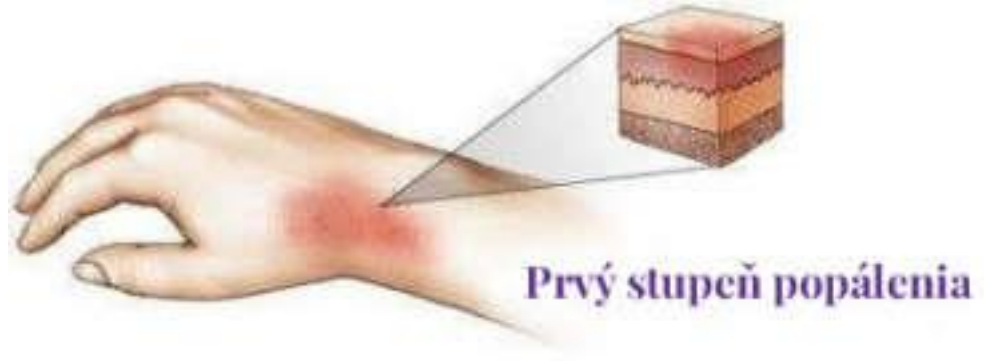
2nd st. - blister

Stage 3 - damage to the skin and subcutaneous tissue

4th st.- charring

Burns





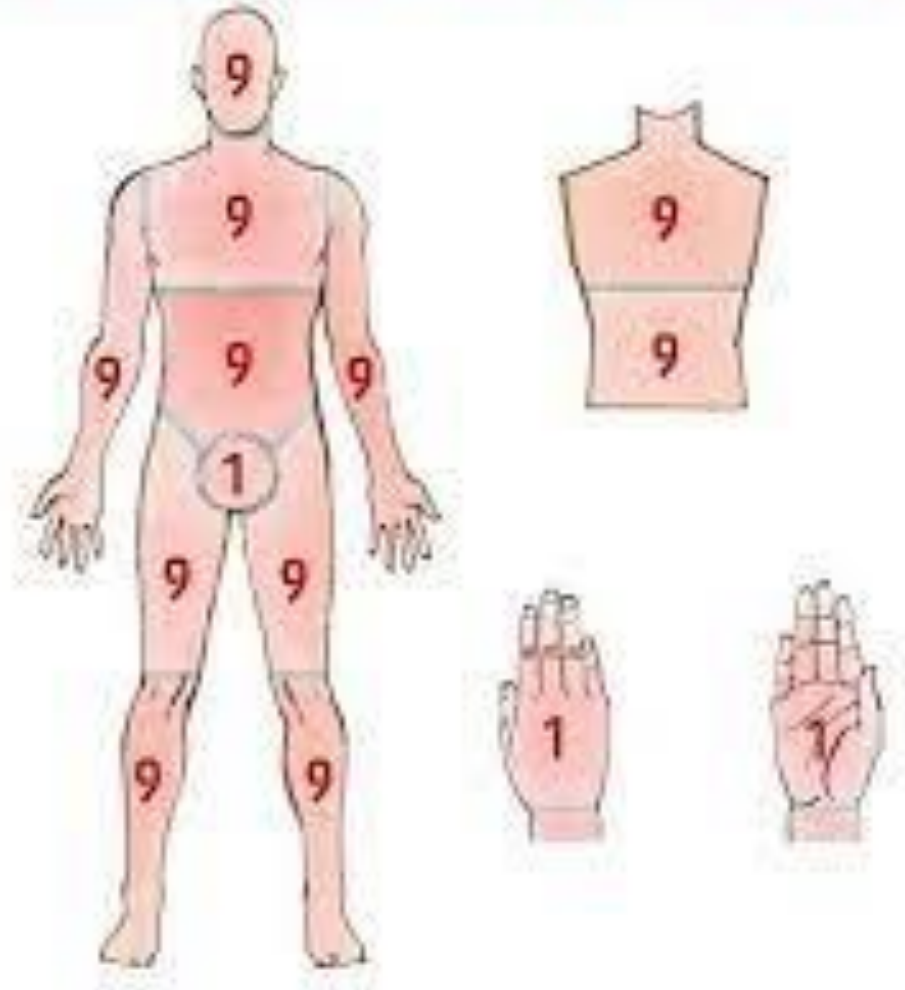
Superficial burns- significant pain

Deep burns- painless, destruction of nerve endings

Burn extension - rule "9"

Approximate: the size of the palm with the fingers of the affected person is 1% of the body surface

ROZDĚLENÍ PLOCHY TĚLA (uvedeno v %)



Burns and scalds - first aid

Objective: to reduce the extent and depth

relieve pain

delay the onset of shock

prevent infection

COOLING - under cold running water 10-20 min. , NO ICE

COVER with clean non-woven fabric, sterile dressing, bag, food foil

DO NOT wipe contaminated parts of clothing.

ANTI-SHOCK-measures and ANALGETICS

TRANSPORT to the hospital



Drinking corrosive: rinse mouth repeatedly with clean water

drink 2-3 dcl of pure water in sips

do not induce vomiting

packaging/sample of the substance for identification

Electric burn: **switch off the electricity**

point burns at the point of entry and exit of electric current

control of consciousness, breathing and circulation

cooling of burns

Burn larger than the area of the affected palm (more than 1%) - hospital treatment.

Burns in the area of the BODY, NECK, GENITALIA AND FINGER OF THE ARMS - treatment in hospital

Burns in the face and neck area - assume also burns of the respiratory tract, there is a risk of swelling and respiratory failure (suffocation due to the airway closure by swollen mucosa)

Rinse splashes with clean tap water, neutralizing solutions are of no use (waste of time in finding and preparing), nor is milk or medicinal charcoal