First aid and resuscitation in special situations

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Special situations

- Poisoning
- Drowning
- Accidental hypothermia
- Electrocution

- Pregnant women
- Children

ERC guidelines 2015
Intoxications

- Drugs overused – sedatives, opioids
- Carbon oxid (CO)
- Alcohol – etyl, metyl, etylen glycol
- Mushrooms – poison amanita
- Botulotoxin
Poisoning – prevention of cardiac arrest

- Assess using the ABCDE approach (Airway, Breathing, Circulation, Disability, Exposure)
- Decreased conscious level
- Airway obstruction, respiratory arrest
- Stomac content aspiration – drugs ventral nervous system depressants
- Early airway opening, tracheal intubation
- Drugs causing hypotension – infusion therapy, vasopressors support (e.g. noradrenalin)
- Long period of coma – rhabdomyolysis - monitoring of K⁺
- Body temperature – impaired termoregulation
- Retain samples - blood, urine, drugs, liquids...
- Decontamination, antidotes

Self – poisoning – alcohol excess
Poisoning

- **Personal safety — rescuer and victim** - CO, paraquat, unexpected cardiac arrest if more than 1 victim
- **Avoid mouth to mouth breathing** - cyanide, hydrogen sulfid, corrosives, organofosphates
- **Tachyarhytmias** — cardioversion (ALS)
- Treatment of minerals and ABB disturbances
- **Poison identification** — relatives, ambulance crews
- Odours, needle marks, pupiles abnormalities, corrosion in the mouth
- **Longer time of resuscitation** — poison eliminated during CPR
- Alternative approaches - higher therapeutic dose
- Consultation with national toxicologic center:
  02 5477 41 66, 0911 166 066
- International program for chemical safety (IPCS)
- on line databasis for informations about toxicology and dangerous chemicals:
  (http://toxnet.nlm.nih.gov/)
Alcohol - ETANOL

Signs of intoxication
- Ataxia
- Dysatria
- Nystagmus
- Sleepiness
- alcoholic odour
- decreased conscious level
- Hypothermia
- Hypoglycemia
- Vomitus
- risk of aspiration and suffocation
- often connected with head trauma

Metabolisation with enzyme alcoholdehydrogenasis
Alcohol - ETANOL

Treatment
• prevention of aspiration – recovery position
• keep airway opened
• glucose solution, thiamin

Comatous patient - naloxon (Intrenon) i.v.
Over 4 promile of alcohol ev. dialysis
Recovery position
Poisoning

- **Open airway** – tilt head and lift chin
- Ventilatory support or artificial ventilation
- circulation - i.v. access, i.v. fluids, if systolic blood pressure below 90 mmHg - 0.9% NaCl 10 ml/kg i.v., R 1/1, H 1/1

**Derhydreatation mainly:**
- Children, fever, long time from poison digestion to arrival of ambulance, atropin and its derivates and psychomimetics poissoning

- Treatment of cardiac rhythm disturbances
  - Bradycardia – cardiostimulation
  - Cardiac arrest - CPR
Poisoning

- Seizures – remove causes, diazepam i.v. ev.
- Thiopental
- Prevention of stomach content aspiration – recovery position
- Optimisation of body temperature
  (possibility of hypo or hyperthermia)
- Provocation of vomitus (only in conscious patients)
- Antidote administration
Poisoning - elimination methods

- Inh. poisoning – CO - fresh air, HBO
- Skin – organophosphates – clean with water-gloves, gown, face mask
- GIT – vomitus - mushrooms, large tbl mechanical irritation of hypopharynx, soup sol.
- Stomac lavage - within 1 our from digestion
Contraindication of vomitus and lavage

Contraindication

- Corrosive, gasoline
- Fat dissolvent, sympatomimetics
- **Decreased conscious level**
- Seizures, arhytmia in history, surgery on oesophagus, oesophageal varices

- Left side position, head down

- Charcoal within 1 hour, 30-60 g a 4-6 hours
  no action against alcohol, glycols

- Secundary elimination – removement of toxic substance from body – forced diuresis, hemodialysis
Stomach lavage

- Remove foreign body from mouth
- Large stomach tube
- Retain stomach contain samples for toxocological assessment
- Saline solution reapplication
### Poisoning - opioids

**Hypoventilation, apnea**

**Prevention of ETI**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naloxon</td>
<td>i.v.</td>
<td>400 µg</td>
</tr>
<tr>
<td></td>
<td>i.m.</td>
<td>800 µg</td>
</tr>
<tr>
<td></td>
<td>s.c.</td>
<td>800 µg</td>
</tr>
<tr>
<td></td>
<td>i.nazál.</td>
<td>2 mg</td>
</tr>
</tbody>
</table>

**Total d.** 6 - 10 mg

**Naloxon** - duration of action 14 - 70 min

Hypoventilation 4 - 5 hours

**Naloxon**

- Pulmonary oedema
- Ventricular arrhythmia
- Agitation
Mushrooms poisoning

- Destruction of kidneys and liver – *poison amanita*
- Enterohepatal circulation of toxins
  Two fases course:
  1. to 7-13 hours GIT, 24-36 hours improvement
  2. kidneys and liver failure
- Lavage of stomac and gut, Legalon(silibinin), activ coal, haemoperfusion, MARS, Tx of liver
- Change by mistake – rosy russula, horse mushroom
Botulotoxin intoxication

- First symptoms a few hours after digestion of food from blown tin
- First symptom – diplopia
- Arrest of breathing – muscles paralysis
- Small children – bee honey
- Serum antibotulinum
- Artificial ventilation
Drowning

- Asphyxia – airways occlusion after drowning
- Connected with aspiration, submersion, bacterial contamination of airways
- Wet drowning - aspiration
- Dry drowning – without aspiration (laryngospasm)
BLS - breathing

- Personal safety
- **Initial artificial breaths** important - 1 min
- Trained professionals in water
- Others - shallow water, waterside
- Non breathing
  - If > 5 min towards the waterside – + 1 min then stop artef. breaths and transfer the victim towards the waterside
  - If < 5 min towards the waterside – transfer synchronized with artificial breaths
  - **No effort to empty airways**
  - Regurgitation by 86% of pac. – breathing and chest compressions
  - BLS, ALS
Drowning — ILCOR classification
(International Liaison Committee on Resuscitation)

- **Immersion** - face and airways under water or other fluid

- **Submersion** - hole body under water or other fluid, airways included

- **No more use:**
  - Wet drowning
  - Dry drowning
  - Drowned
  - Near drowned

- **Utstein protocol for registration**

Drowning

- **Secondary drowning** – respiratory insufficiency
- 72 hours after submersion/immersion
- Every patient *hospitalized*
Drowning

- Hypoxia
- Cold environment: better tolerancy of hypoxia
- Decreased rate of metabolism
- Start resuscitation even after 20-60 min of submersion
BLS

- **Breathing**
- **Chest compression** – not effective in the water, start on the waterside
- **C spine**
- **Dry skin**
- **When BT< 30°C** – maxim. 3 shocks, continue after warming
Accidental hypothermia

<table>
<thead>
<tr>
<th>Stage</th>
<th>Temperature Range</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>35 - 32 °C</td>
<td>warming</td>
</tr>
<tr>
<td>Mild</td>
<td>32 - 28 °C</td>
<td>BLS</td>
</tr>
<tr>
<td>Severe</td>
<td>&lt; 28 °C</td>
<td>ALS when normothermia BT &gt;35 °C</td>
</tr>
</tbody>
</table>

Swiss staging system
- 5 steps
hypothermia before asphyxia — good outcome

- stiff chest
- warming to BT 30 °C, doubled intervals between drug doses
Pregnant women resuscitation

Causes of cardiac arrest

- Cardiac disease
- Trombembolism
- Fetal water embolism
- Pregnancy related hypertension
- Extra-uterine gravidity
- Bleeding
- Sepsis
- Psychiatric disorders

ERC, 2010
Pregnant women resuscitation

• Left lateral position (15 degrees left)

• Hands position upper than in the middle of sternum

• Adhesive electrodes more useful

• OTI with the pressure on the cricoideal cartilage (Sellick maneuver)
Pregnant woman resuscitation

- Delivery can improve the chance on successful resuscitation of mother and newborn
- Beginning of the hysterotomy would be in 4 min. after cardiac arrest
Pregnant woman resuscitation

• Gestational age < 20 weeks: no C.S.

• Gestational age 20 - 23 weeks: urgent C.S. fore mother sake

• Gestational age ≥ 24 - 25 weeks: urgent C.S. for mother and newborn sake
Defibrillation by pregnant women

- Adhesive electrodes
- Standard energy – 150-200 J biphasic
  360 J monophasic
Electrocution

- Devastating multisystem injury
- **Adults in the workplace, high voltage**
- **Children primarily at home**, voltage is lower (220V in Europe, Australia and Asia; 110V in the USA and Canada)
- Electrocution from lightning strikes
- Electric shock injuries - direct effects of current on cell membranes and vascular smooth muscle
- Respiratory arrest may be caused by *paralysis* of the central respiratory control system or the respiratory muscles
- Current may precipitate *VF* if it traverses the myocardium during the vulnerable period (analogous to an R-on-T phenomenon)
- Electrical current may also cause *myocardial ischaemia* because of coronary artery spasm
- Asystole may be primary, or secondary to asphyxiation following respiratory arrest
Electrocution - resuscitation

- Ensure that any power source is switched off and do not approach the casualty until it is safe
- Start **standard basic and advanced life support** without delay
- **Airway management may be difficult** if there are electrical burns around the face and neck
- Early tracheal intubation is needed in these cases, as extensive soft-tissue oedema may develop causing **airway obstruction**
- **Head and spine trauma** can occur after electrocution
- Immobilize the spine until evaluation can be performed
- **Muscular paralysis**, especially after high voltage, may persist for several hours; ventilatory support is required during this period.
- **VF** is the commonest initial **arrhythmia** after high-voltage AC shock; treat with prompt attempted defibrillation
- Asystole is more common after DC shock; use standard protocols for this and other arrhythmias.
Electrocution - resuscitation

- **Remove smouldering** clothing and shoes to prevent further thermal injury
- **Maintain spinal immobilization** if there is a likelihood of head or neck trauma
- Conduct a thorough secondary survey to exclude traumatic injuries caused by tetanic muscular contraction or by the person being thrown
- Electrocution can cause severe, **deep soft-tissue injury** with relatively minor skin wounds, because current tends to follow **neurovascular** bundles
Lightning strike

- Lightning strikes deliver as much as 3000 - to millions volts a some 100 A over a few milliseconds
- More people strucked
- In those who survive the initial shock, **hypertension**, tachycardia, non-specific ECG changes and myocardial necrosis
- Mortality from lightning injuries is as high as 30%, with up to 70% of survivors sustaining significant morbidity
- Current present arround victim
- **Safety**, ABCDE acces
High voltage injury

- 22 000 volts
- Burns of 3.- 4. degrees
- Fall from a height
- Brain injury
- Spinal injury
Paediatric basic life support

Simplification based on the knowledge that many children receive no resuscitation at all because rescuers fear doing harm

Age:
- a newborn – from delivery to 1 month
- an infant - a child under 1 year of age
- a child - between 1 year and puberty
- an adolescent – to the age of 19 years
Basic life support in children

- Ensure the safety of rescuer and child
- Check responsiveness
- Gently stimulate the child and ask loudly: “Are you all right?”
- If the child responds by answering or moving:
  - Leave the child in the position in which you find him
  - Check his condition and get help if needed (112, 155)
- Reassess him regularly
Paediatric BLS

- If the child **does not respond**:  
- Shout for help  
- Turn carefully the child on his back  
- Open airway – tilt head and lift chin  
  Place your hand on his forehead and gently tilt head back  
  Lift chin with two your fingers  
  Do not push the soft tissue under the chin  
- If airway is still not opened, push the jaw forward with two fingers placed behind childs mandible
If the child does not respond and is not breathing normally

- Remove any obvious airway obstruction
- 5 rescue breaths
- 30 chest compressions : 2 breaths
- **CPR 1 minute**
- Call ambulance 112,155
- Continue with CPR
Pediatric life support
BASIC LIFE SUPPORT (BLS)

A - Airway
B - Breathing
C - Circulation (CAB)
CPR IN CHILDREN

- Adult CPR techniques can be used on children

- Compressions $\frac{1}{3}$ of the chest depth in newborn, 4-5 cm in children
BLS children

- Look for **signs of a circulation**: any movement, coughing or normal breathing *(not agonal gasps, which are infrequent, irregular breaths)*
<table>
<thead>
<tr>
<th>Approach safely</th>
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<tbody>
<tr>
<td>Check response</td>
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<tr>
<td>Shout for help</td>
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<td>Open airway</td>
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</tr>
<tr>
<td>Check breathing</td>
<td>Check breathing</td>
</tr>
<tr>
<td>5 breaths, 30 chest compressions - 1 min.</td>
<td>Call 112</td>
</tr>
<tr>
<td>Call 112, 155</td>
<td>Attach AED</td>
</tr>
<tr>
<td>2 rescue breaths</td>
<td>Follow voice prompts</td>
</tr>
</tbody>
</table>
Paediatric basic life support

- UNRESPONSIVE?
  - Shout for help
  - Open airway

- NOT BREATHING NORMALLY?
  - 5 rescue breaths

- NO SIGNS OF LIFE?
  - 15 chest compressions
  - 2 rescue breaths

Call cardiac arrest team or Paediatric ALS team

Bystander or 1 professional 30:2

Two professionals 15:2
BLS children

- **Compression/ventilation ratio**
  - 30:2 – bystanders, single professional
  - 15:2 – two professionals

- **Ventilation**
  - 5 breaths first
  - Mouth to mouth and nose
  - Mouth to mouth
  - Duration of inspirium 1 – 1,5 s
Recovery position

Child not responding but breathing regularly
Automated External Defibrillation Algorithm

Unresponsive?
- Call for help

Open airway
- Not breathing normally
  - Send or go for AED Call 112*

CPR 30:2
- Until AED is attached

AED assesses rhythm

Shock advised
- 1 Shock
  - Immediately resume: CPR 30:2 for 2 min

No shock advised
- Immediately resume: CPR 30:2 for 2 min

Continue until the victim starts to wake up: to move, open eyes and to breathe normally

* or national emergency number
AED - children

- Age > 8 years
  - AED as adult

- Age 1-8 years
  - Use electrodes and device for children if accessible/or adult

- Age < 1 rok
  - Use only if safe
ATTACH PADS TO CASUALTY’S BARE CHEST
ANALYSING RHYTHM
DO NOT TOUCH VICTIM
SHOCK INDICATED

- Stand clear
- Deliver shock
DEFIBRILLATION
Rescue breath for an infant

- Take a breath and cover the mouth and nasal apertures of the infant with your mouth, making sure you have a good seal.

- Blow steadily into the infant’s mouth and nose over 1—1.5 s, sufficient to make the chest visibly rise.

- Take another breath and repeat this sequence five times.
Rescue breath for a child over 1 year

- Head tilt and lift chin
- Place your hand on his forehead
- Pinch the soft part of the nose closed with the index finger and thumb of that hand
- Open the mouth and maintain chin lift
- Blow steadily into mouth over about 1-1,5 sec. watching for chest rise
- Take another breath and repeat this sequence 5 times
BLS children

No effective breathing:
- the airway may be obstructed.
- Open the child’s mouth and remove any visible obstruction

- Ensure that there is adequate head tilt and chin lift airway

- Make up to five attempts to achieve effective breaths; if still unsuccessful, move on to chest compressions.
Ventilation
Chest compressions

Xiphoid process — Sternum
BLS children

• look for **signs of a circulation:** any movement, coughing or normal breathing (not agonal gasps, which are infrequent, irregular breaths);
Chest compressions - children
Chest compression
Foreign body obstruction

Adult Foreign Body Airway Obstruction Treatment

**Assess severity**

- **Severe airway obstruction (ineffective cough)**
  - Unconscious: Start CPR
  - Conscious: 5 back blows, 5 abdominal thrusts

- **Mild airway obstruction (effective cough)**
  - Encourage cough: Continue to check for deterioration to ineffective cough or until obstruction relieved
Newborn resuscitation

- Start breathing – mouth to mouth and nose
- 3 chest compressions : 1 artificial breath – 2 fingers
- 3:1
Thanks for Your attention
Thanks for Your attention