

Advanced Emergency Resuscitation/SŠ (Nurse)

ALS - advanced life support - extended emergency resuscitation, which is carried out by a medical professional using drugs, aids and special procedures = provision of professional first aid. **Cardiopulmonary resuscitation** (CPR) is indicated for loss of consciousness when normal breathing is not present.

Procedure for extended emergency resuscitation

Performed by medical personnel.

1. Assess the situation, the quality of consciousness (addressing, shaking); a life-threatening bleeding condition.
 2. Open the airway by tilting the head.
 3. Check breathing (hear, see, feel), it must not last more than 10 seconds.
 4. Use the defibrillator as quickly as possible, evaluate the ECG curve **pulseless ventricular tachycardia and ventricular fibrillation** are indications for shock delivery.
 5. Deliver the 1st shock (monophasic defibrillator 360 J, biphasic defibrillator 150-200 J).
 6. CPR 30:2 (frequency 100-120 per minute, depth 5-6 cm) + secure airway, secure i.v. entry (in the field, 2 attempts then i.o.); duration 2 minutes.
 7. Assess ECG, deliver 2nd shock (monophasic defibrillator 360, biphasic defibrillator 200-360 J).
 8. CPR 30:2 + ensure i.v. input.
 9. Assess ECG, deliver 3rd shock (monophasic defibrillator 360, biphasic defibrillator 200-360 J).
 10. CPR 30:2 + adrenaline 1 mg + amiodarone 300 mg.
 11. Assess ECG, deliver 4th shock (monophasic defibrillator 360, biphasic defibrillator 200-360 J).
 12. CPR 30:2 + amiodarone 150 mg (pulseless ventricular tachycardia and ventricular fibrillation).
 - Adrenaline every 3-5 minutes.
 - We continue CPR + defibrillation + drug administration.
- If we evaluate the ECG as a non-fibrillatable rhythm (**asystole, pulseless electrical activity**), give Adrenaline IMMEDIATELY as soon as we secure an i.v. (i.o.) entry!

A - airway → patency of airways

- This step involves clearing the airway.
 - Manual examination of the oral cavity.
 - Head tilt.

Aids ensuring airway patency

- Air passages (oral, nasal).
- Endotracheal intubation with laryngeal tube, performed by a doctor.
- Combitubus.
- Laryngeal mask.
- Konio puncture - when intubation is impossible and other aids fail.

<mediaplayer><https://www.youtube.com/watch?v=sc4BEJLefjo&feature=youtu.be></mediaplayer>

- Part of securing the airways should be CO₂ monitoring. CO₂ is the first value responding to the restoration of blood circulation - it responds by rising.



How to choose the right size

B - breathing → breathing

- Securing the airway should not delay cardiac massage.
- The volume we inhale into an adult is about 500 ml of air (7-9 ml/kg), I use my own normal breath.

Devices used for artificial respiration

- Resuscitation mask - increases the safety of the rescuer.
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- Ambuvak with a mask - should have a reservoir and an oxygen supply.

<mediaplayer>https://www.youtube.com/watch?v=V_AhArkj9Lk&feature=youtu.be</mediaplayer>



Established airway

C - circulation → circulation

1. We kneel from the side next to the affected person, who is placed on a solid surface (ideally the ground).

2. Place the joined hands on the center of the chest - between the breasts. The upper limbs must be bent at the elbows!
3. We compress the chest approx. 5-6 cm deep.
 - Frequency of compressions is 100-120 compressions per minute.
 - Compression:relaxation = 1:1.
4. Aids can be used - Lucas, Autopulse, cardio pump.
 - With an effective heart massage, we are able to ensure 30% of the minute cardiac output.

<mediaplayer> <https://www.youtube.com/watch?v=hZqwJYPQbM&feature=youtu.be> </mediaplayer>



Appropriate mask size

D - defibrillation → performing urgent defibrillation

- Immediate performance in the treatment of ventricular fibrillation and pulseless ventricular tachycardia.
- Maximum available energy for a monophasic defibrillator (360 J); energy of 150-360 J in a biphasic defibrillator.
- For children, energy 4 J/kg.
- Possibility of 3 shocks in a row if a medical professional witnesses ventricular fibrillation (monitoring, during catheterization, etc.).

⚠️ On defibrillation - regardless of the shock result, another resuscitation immediately follows! The assessment of whether an effective rhythm has been restored is carried out after approx. 2 minutes (5 cycles) of resuscitation. → Interruption of massage max. 5 s



Position of hands during CPR

E - EKG → electrocardiography

- ECG rhythm analysis.
- Summation leads (3, 4 or 5 leads) or 12-lead ECG.
- Diagnosis of chin or tachyarrhythmias.

🔗 For more information see *Brief Overview of Arrhythmias/SES (Nurse)*.

Pacemaker

- Indicated for bradyarrhythmias with impaired consciousness.
- Transcutaneous (transthoracic) × transesophageal × transvenous.
 - In the conditions of pre-hospital care, transcutaneous cardiostimulation is used.

<mediaplayer><https://www.youtube.com/watch?v=iKCD73QoqXY&feature=youtu.be></mediaplayer>



Appearance of defibrillation paddles

F - fluids and drugs → administration of drugs and solutions

- O₂ - hyperoxemia is harmful.
- Adrenaline - increases the effectiveness of defibrillation, dosage 1 mg i.v. in an adult (0.01 mg/kg) after the 3rd defibrillation.
- Amiodarone - treatment of ventricular fibrillation and ventricular tachycardia, dosage 300 mg after the 3rd cycle, repeatedly 150 mg → 900 mg by infusion for 24 h.
- Administration of drugs intravenously or intraosseously, intrabronchial administration of the drug is not recommended.



Adhesive paddles for defibrillation

G - gauging → balance sheet

- Consideration of the primary cause, the appearance of the surroundings, the mechanism of the injury.

Reversible causes of heart failure

- 4H: hypoxia, hypovolemia, hyperkalemia (hypokalemia, hypocalcemia), hypothermia.
- 4T: tension pneumothorax, cardiac tamponade (including chest trauma), toxic substances (poisoning, overdose), thromboembolic event.
- Accidental hypothermia → extension of CPR.
 - Medicines work from 30 °C, CPR is performed until TT increases to 35 °C.
- Drowning → artificial respiration as soon as possible.

- Hyperthermia → cool, dantrolene in malignant hyperthermia.
- Electrotrauma → prolonged CPR, often CNS and myocardial damage.
- Pregnancy → suitable support of the hip up to approx. 15°, equip the fetus within 5 minutes. With subsequent newborn CPR.
- Bronchial asthma → higher energy during defibrillation, longer apneic pauses for easier exhalation.
- Intoxication → what was he doing?, contact Toxikologické information center (<http://www.tis-cz.cz/>), antidote.

H - human mentation, hypothermia → preservation of brain functions, hypothermia

- Preservation of brain functions while maintaining normal flow (50 ml/100g/min.).
- Timely initiation of emergency CPR.
- Administration of oxygen.
- Maintaining BP at CNS perfusion value – MAP 60–150 TORR → CPP 50–150 TORR.
 - CPP = MAP – ICP (norm. up to 10 TORR)

Cooling to maintain normothermia in intensive care after arrest. Currently (2021) the concept of therapeutic hypothermia described below is abandoned. **Target temperature is recommended up to 36 °C.** Guidelines 2021 summary infographic (<https://www.cprguidelines.eu/assets/other-documents/Post-Resus-Infographics.pdf>) and [<https://zachrannasluzba.cz/cilena-hypotermie-po-resuscitaci-game-over/> article by O. Fraňka ZZS HMP]. The following text therefore only describes the methodology of hypothermia.

Therapeutic hypothermia

- The indication is non-traumatic circulatory arrest → the goal is to suppress chemical reactions associated with reperfusion trauma – production of oxygen radicals, release of excitatory amino acids, Ca movements → apoptosis, damage to mitochondria.
- Includes administration of cold infusion solutions, application of ice, use of cooling blankets → the goal is to reach a body temperature of 32–34 °C within approx. 4 hours.
- 4 °C solution in the amount of 30 ml/kg will reduce TT by 1.5 °C.
- Starting already in the ZZS car.
- On acute beds, warm up the patient/client after 24–48 h → 0.5 °C/hour of heating.
- Analgo-sedation with UPV, in case of muscle tremors, it is possible to administer myorelaxants.

NEW ENGLAND JOURNAL OF MEDICINE

Hypothermia vs. Normothermia after Out-of-Hospital Cardiac Arrest

OPEN-LABEL TRIAL WITH BLINDED OUTCOME ASSESSMENT

	Hypothermia (target body temperature, 33°C) N=925	Normothermia (target body temperature, 37°C) N=925
1850 Comatose adults after out-of-hospital cardiac arrest		
Death from any cause at 6 mo	50% RR, 1.04; 95% CI, 0.94 to 1.14; P=0.37	48%
Modified Rankin scale score ≥4 at 6 mo	55% RR, 1.00; 95% CI, 0.92 to 1.09	55%
Arrhythmia with hemodynamic compromise	24%	17%
Hypothermia did not lead to a lower 6-mo incidence of death than normothermia.		

J. Dankiewicz et al. N Engl J Med 2019;381:1021–1031 Copyright © 2019 Massachusetts Medical Society

Temperature up to 37.5 has the same results and fewer complications than 33

Monitoring

- TT must be measured continuously and invasively
 - Esophageal tube
 - Probe in the bladder
 - Sensor as part of S-G catheter
- Physiological functions – invasive BP, ECG monitoring, GCS, depth of sedation, gases in ASTRUP, CO₂ sensor

Hypothermia does not start

- Repeated cardiac arrest.
- Arrhythmia unresponsive to treatment with worsening P/K status.
- Significant circulatory instability with signs of hypoperfusion.
- Coagulopathy and life-threatening bleeding manifestations of P/K.
- Uncorrectable disorder of the internal environment.

Contraindications

- Patient/client conscious.
- Terminal state of the disease, a state precluding P/K survival.
- Sudden circulatory arrest (SCA) caused by injury or bleeding.
- Cause of unconsciousness other than NZO.
- Shock with hypotension unresponsive to therapy.
- Pulmonary edema.
- Recurrent ventricular tachyarrhythmias unresponsive to treatment.
- Bradyarrhythmia requiring cardiac pacing.
- Accidental hypothermia.
- Serious immunodeficiency disorders.

I - intensive care → post-resuscitation care

- On dept. ARO, ICU.
- Care of the respiratory tract - UPV.
- Maintenance of normotension.

- Resolving trauma, treating wounds.
- Adequate P/K nutrition.
- Prevention of infection, treatment of septic conditions.
- Rehabilitation.

Post-resuscitation syndrome

- The result of ischemia followed by reperfusion of organs with a combination of inflammation and multi-organ dysfunction, injuries caused by CPR.
 - Hypoxic encephalopathy.
 - Myocardial dysfunction.
 - Aspiration pneumonia.
 - Ischemic intestinal damage.
 - Renal dysfunction.
 - Peripheral limb ischemia.

Links

Related Articles

- Cardiopulmonary resuscitation/SŠ (nurse)
- Basic emergency resuscitation/SŠ (nurse)

External links

- Template:Acute

References

- ano. European Resuscitation Council Guidelines for Resuscitation 2010 Section 1. Executive summary. *Resuscitation* [online]. 2010, y. 81, vol. -, p. 1219–1276, Available from <[http://resuscitation-guidelines.articleinmotion.com/article/S0300-9572\(10\)00447-8/pdf/european-resuscitation-council-guidelines-for-resuscitation-2010-section-1-executive-summary](http://resuscitation-guidelines.articleinmotion.com/article/S0300-9572(10)00447-8/pdf/european-resuscitation-council-guidelines-for-resuscitation-2010-section-1-executive-summary)>. ISSN 0300-9572.
- BYDŽOVSKÝ, Jan. *Akutní stavy v kontextu*. 1. edition. Triton, 2008. ISBN 978-80-7254-815-6.

External links

- Společnost urgentní medicíny a medicíny katastrof (<https://www.urgmed.cz:443/>)
- Česká resuscitační rada (<http://www.resuscitace.cz>)
- Záchranná služba: nezávislý web o záchranné službě (<https://www.zachrannasluzba.cz:443/>)