

# PALS - pharmacotherapy, defibrillation

Tereza Musilová

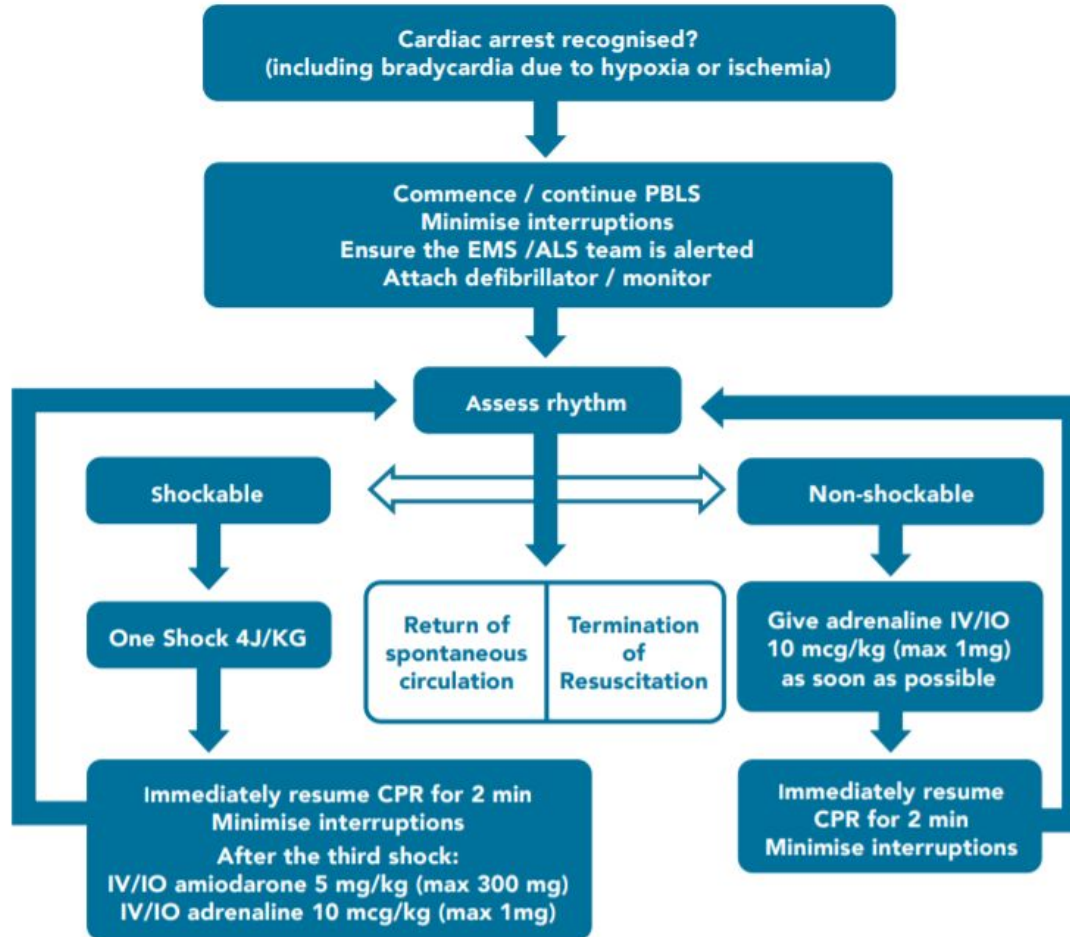
# Learning objectives

- The student will know the indications and dosage of drug used in PALS.
- The student will learn to dilute epinephrine for administration in children.
- The student will know the difference between electrical cardioversion and defibrillation.
- The student will learn the indications of electrical cardioversion and defibrillation including energy doses.
- The student will know the placement of self-adhesive defibrillator pads/defibrillation paddles in children.

# PALS - pharmacotherapy, defibrillation

- PALS and differences compared to ALS
- drugs used in PALS, indications and doses
- the difference between defibrillation and electrical cardioversion
- indications of defibrillation and electrical cardioversion and how to do it

## SAFE? - SHOUT 'HELP'



# In the course of PALS

- PALS is a **team activity** and several interventions will be done in parallel
- provide bag-mask ventilation with 100 % oxygen (2-person approach)
- apply cardiac monitoring as soon as possible
- differentiate between shockable and non-shockable cardiac rhythms
- vascular access (intravenous, intraosseous)

- consider an advanced airway and capnography (if competent)
- provide continuous compressions when a tracheal tube is in place
- ventilate at a rate of 25 (infants) – 20 (1-8y) – 15 (8-12y) or 10 (>12y) per minute
- correct reversible causes (“4H, 4T”)

#### **CORRECT REVERSIBLE CAUSES**

- Hypoxia
- Hypovolaemia
- Hyper/hypokalaemia, -calcaemia, -magnesiumemia; Hypoglycaemia
- Hypothermia - hyperthermia
- Toxic agents
- Tension pneumothorax
- Tamponade (cardiac)
- Thrombosis (coronary or pulmonary)

**ADJUST ALGORITHM IN SPECIFIC SETTINGS (E.G. TRAUMA, E-CPR)**

# Pharmacotherapy

- epinephrine
- amiodarone

**Flush after each drug.**

# Epinephrine

- the drug of choice in cardiorespiratory arrest
- an endogenous catecholamine with potent alpha and beta-1, beta-2 adrenergic-receptor stimulating properties
- the dose is **10 mcg/kg**
- a maximum single dose is 1 mg
- the **intravenous and intraosseous routes** are both effective for the administration of epinephrine

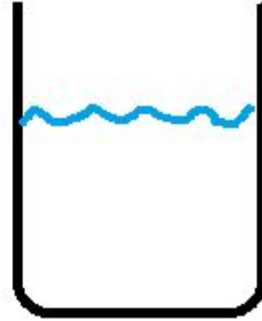


# Epinephrine dilution for administration in children



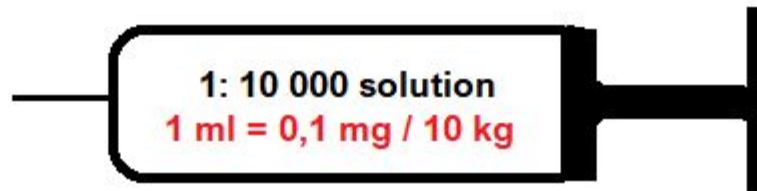
1 mg of epinephrine (= 1 ml)

+



9 ml 0,9 % saline solution

=



# Epinephrine

## Non-shockable rhythm

It is given **every**  
**3 - 5 minutes.**

## Shockable rhythm

It is given it is given **after the**  
**3rd and the 5th shock** and then  
every 3-5 minutes.

# Amiodarone

- antiarrhythmic drug, a non-competitive inhibitor of adrenergic receptors
- it is given together with adrenaline in the treatment of defibrillation refractory shockable rhythms **after the 3rd shock and the 5th shock**
- the doses: after the 3rd shock **5 mg/kg** (max 300 mg), after 5th shock **5 mg/kg**, max 150 mg
- the **intravenous and intraosseous routes** for the administration of amiodarone
- lidocaine IV might be used as an alternative to amiodarone

# Defibrillation

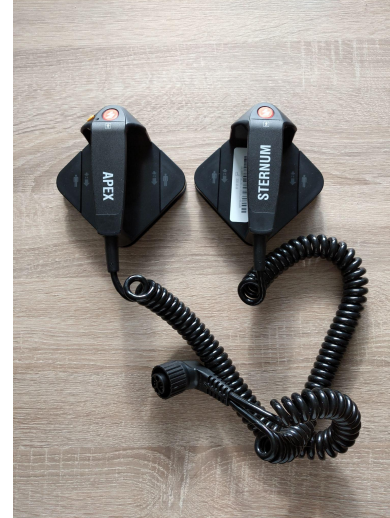
= the delivery of an **unsynchronized electrical shock**. The aim is depolarization as many myocytes as possible and the termination of malignant arrhythmias.

# Electrical cardioversion

= the delivery of a **synchronized electrical shock**. The aim is the termination of reentry and to restore the sinus rhythm. E.g. unstable supraventricular tachycardia, atrial flutter, atrial fibrillation.

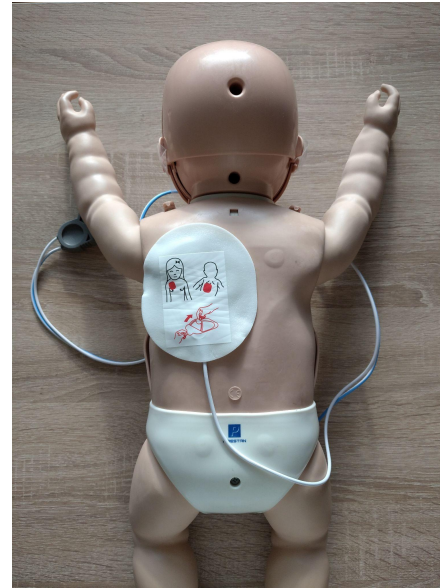
# Self-adhesive pads and paddles

- **self-adhesive pads** - has become the standard
- paddles (with preformed gel pads) is still considered an acceptable alternative



# Pads position

- antero - lateral (AL) position
- antero - posterior (AP) position



# Defibrillation

- the treatment of malignant arrhythmia (pulseless ventricular tachycardia (pVT) and ventricular fibrillation (VF))
- energy dose: **4J/kg** (not to use doses above those suggested for adults (120 - 200 J))
- for refractory VF/pVT (i.e. more than 5 shocks needed)  
→ **consider escalating doses - stepwise increasing up to 8 J/Kg** and max. 360 J

# Electrical cardioversion

- the treatment of unstable supraventricular tachycardia (the most often using in children)
- **1st shock - 1J/kg**
- **double the energy for each subsequent attempt up to a maximum of 4 J/kg**



# Take home message

- Epinephrine is given every 3-5 minutes of CPR in non-shockable rhythm.
- Epinephrine and amiodarone are given after the 3rd and 5th shock in shockable rhythm.
- Electrical cardioversion is a delivery of a synchronized electrical shock and defibrillation is a delivery of an unsynchronized electrical shock.

# Sources

- ERC guidelines 2021

MUNI  
MED

Lékařská fakulta Masarykovy univerzity  
2021