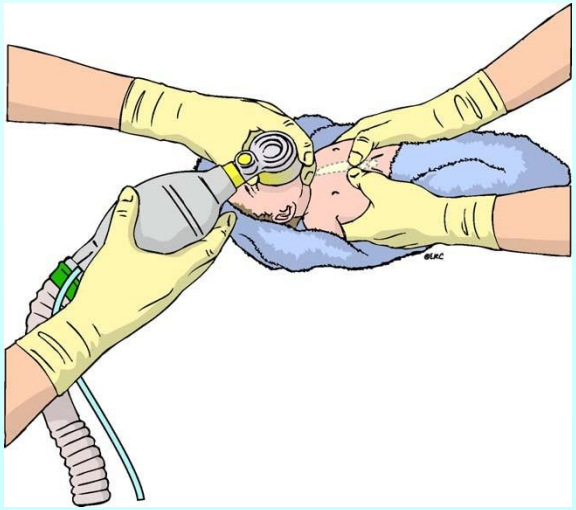
Resuscitation in special situations

M. Grochová MD, PhD.
I.KAIM, UPJŠ LF and UNLP, Košice
First aid GM 1, DM 2 2020

Special situations

- Poisoning
- Drowning
- Accidental hypothermia
- Electrocution

- Pregnant women resuscitation
- Children resuscitation



Poisoning – prevention of cardiac arrest

- **ABCDE** access
- Most often – airways **obstruction**, apnea
- **Consciousness disturbance**
- **Stomach content aspiration** –drugs – CNS depression
- **Early** airways opening
- **Low blood pressure** - infusions, vasopressors (e.g. noradrenalin)
- Long lasting coma without movement - **rhabdomyolysis (muscles destruction)**

- **Potassium monitoring**
- Body temperature disturbances
- Drugs overdosing - hypothermia or hyperthermia (hyperpyrexia)
- **Blood and urine samples saved for hospital**
- **Save drug or other material**
- Decontamination
- Suicide often connected with alcohol intoxication

Poisonning management

- **Seizures** treatment **-** diazepam i.v. ev. Thiopental)
- Prevention of **aspiration** – recovery position
- **Vomitus** activation (only **awake** patient) – not very recommended
- **Contraindication of vomitus -** alkali burns – oesophagus, stomach
- **Antidote** application

Elimination methods in poisoning

- **Inhalation** – CO - fresh air, HBO
- **Skin** - organophosphates-water cleaning – gloves, face mask, safety coating
- **GIT** – vomiting
- Stomach lavage, active coal
- To 1 hour after ingestion
- **Elimination from organism** – kidneys (dialysis...)

Stomach lavage

- Dilution of 45 g **normal saline** (cca 3 soup spoon) in 5 liters of cool water
- Lavage as long as clear water flows - mushrooms
- **Active coal** 1g/ 1 kg body weight in 250 ml of water

Poisoning - opioids

Depression of breating, apnoe

Prevention of tracheal intubation

naloxon 400 µg i.v.
800 µg i.m
800 µg s.c.
2 mg i.nasal

Total dose 6 - 10 mg

Duration of action

naloxon 14 - 70 min

depression of breathing 4 - 5 hod

Naloxon

pulmonary oedema

cardiac arrhytmias

agitation

Drowning

- **Asfyxia** – airways occlusion after drowning
- Connected with aspiration, submersion, bacterial contamination of airways

- **No longer** used clasification:

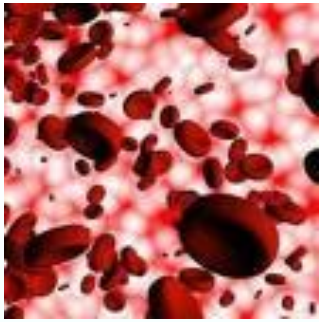
  Wet drowning - aspiration

  Dry drowning – without aspiration (laryngospasm)

BLS - breathing

- Personal safety
- Initial arteficial 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 arteficial breaths
  - **No effort to empty airways**
  - Regurgitation by 86% of pac. – breathing and chest compressions
  - BLS, ALS

Drowning



Fresh water:

liquid shifts into vessels because of low osmotic pressure
- hypervolemia, haemolysis

Sea water:

liquid shifts into lungs because of high osmotic pressure
- hypovolemia, haemoconcentration

Drowning – ILCOR clasification

(*International Liaison Committee on Resuscitation)*

- **Immersion – face and airways** under water or other fluid
- **Submersion – whole body** under water or other fluid, airways included

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

- **Utstein protocol for registration**

Youn CS, Choi SP, Yim HW, Park KN Out-of-hospital cardiac arrest due to drowning: An Utstein Style report of 10 years of experience from St. Mary's Hospital. Resuscitation. 2009 Jul;80(7):778-83. Epub 2009 May 13.

Drowning

- **Secundary drowning – respiratory insuficiency**
- **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

Light 35 - 32 º C

Mild 32 - 28 º C

Severe < 28 º C

Swiss staging system

- 5 steps

hypothermia before asfyxia – **good outcome**

warming

BLS

ALS when normothermia BT >35 ºC

stiff chest

warming to BT 30 ºC, doubled intervals between drug doses

Pregnant women resuscitation

Causes of cardiac arest

- Cardiac disease
- Trombembolism
- Amniotic fluid embolism
- Pregnancy related hypertension
- Extra-uterine gravidity
- Bleeding
- Sepsis
- Psychiatric disorders

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 arest

Pregnant woman resuscitation

- Gestational age < 20 weeks : no C.S.
- Gestational age 20 - 23 weeks : urgent C.S. for mother sake
- Gestational age > = 24 - 25 weeks : **urgent C.S.** for mother and newborn sake

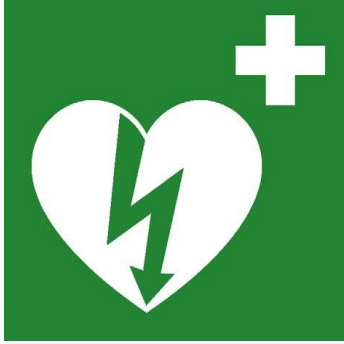
Pregnant women defibrilation

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

Prevention of cardiac arrest in pregnant women

- Left lateral position or shift uterus manually to the left side
- According to pulse oximetry high flow oxygen inhalation
- Bolus of fluids if hypotension or signs of hypovolemia
- Immediately check the need of some drugs
- Immediately call specialists – obstetrician, neonatologist
- Recognize and treat the cause of cardiac arrest

Electrocution



Alternate current (AC)

- Tetanic seizures
- Arrest of breathing – respiratory center paralysis, muscles
- VF R-T phenomenon
- Spasm of coronary arteries, ischemia
- Hand to hand – fatal outcome

Continuous current (CC)

asystole

- primary
- secondary

Lightning strike

BLS 30 minutes current present in environment

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 ischemia because of coronary artery spasm
- Asystole may be primary, or secondary to asphyxia following respiratory arrest

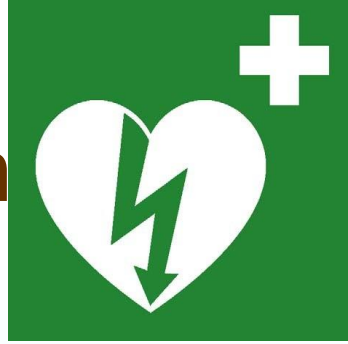
ERC 2010

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 edema 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; ventilation 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.

ERC 2010

Electrocution - resuscitation



- **Remove smouldering** clothing and shoes to prevent further thermal injury
- Vigorous fluid therapy is required if there is significant tissue destruction
- Maintain a good urine output to enhance the excretion of myoglobin, potassium and other products of tissue damage
- Consider early surgical intervention in patients with severe thermal injuries
- **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
- look carefully for features of compartment syndrome, which will necessitate fasciotomy.

ERC 2010

Lightning strike

- Lightning strikes deliver as much as 300 kV over a few milliseconds
- In those who survive the initial shock, extensive catecholamine release or autonomic stimulation may occur
- hypertension, tachycardia, non-specific ECG changes (including prolongation of the QT interval and transient T-wave inversion) and myocardial necrosis
- Mortality from lightning injuries is as high as 30%, with up to 70% of survivors sustaining significant morbidity ERC 2010

Paediatric basic life support

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

Age:

newborn

an infant - a child under 1 year of age

a child - between 1 year and puberty

Pediatric life support

BASIC LIFE SUPPORT (BLS)

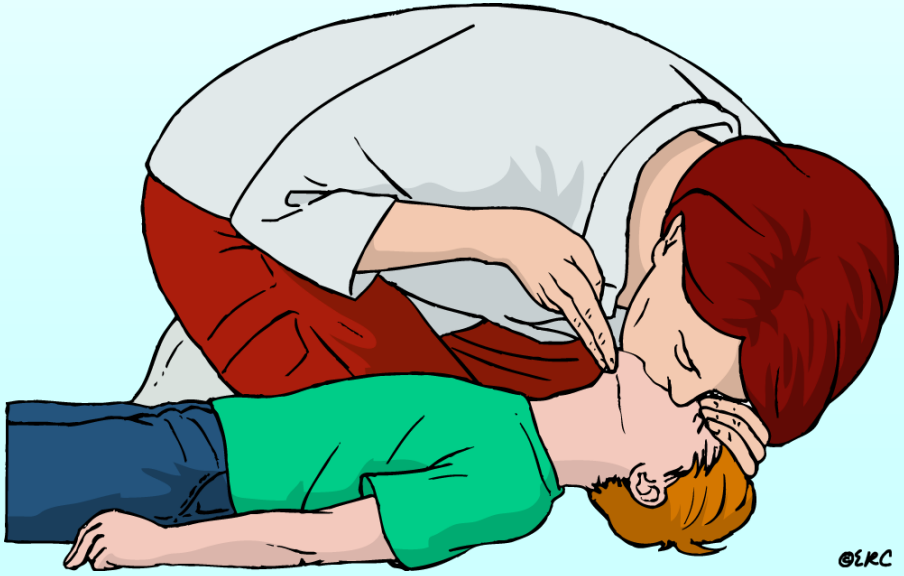
Airway

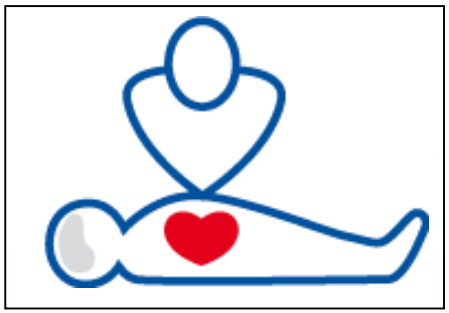
Breathing

Circulation **(CAB)**

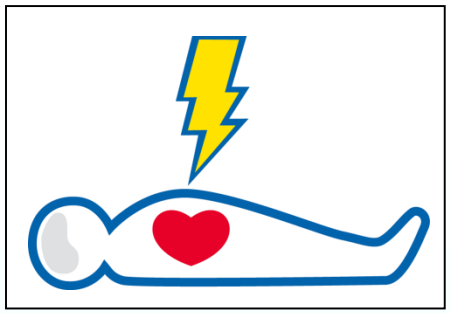
CPR IN CHILDREN

- Adult CPR techniques can be used on children
- Compressions 1/3 of the depth of the chest





Approach safely
Check response
Shout for help
Open airway
Check breathing
Call 112
5 breaths, 30 chest compressions
2 rescue breaths

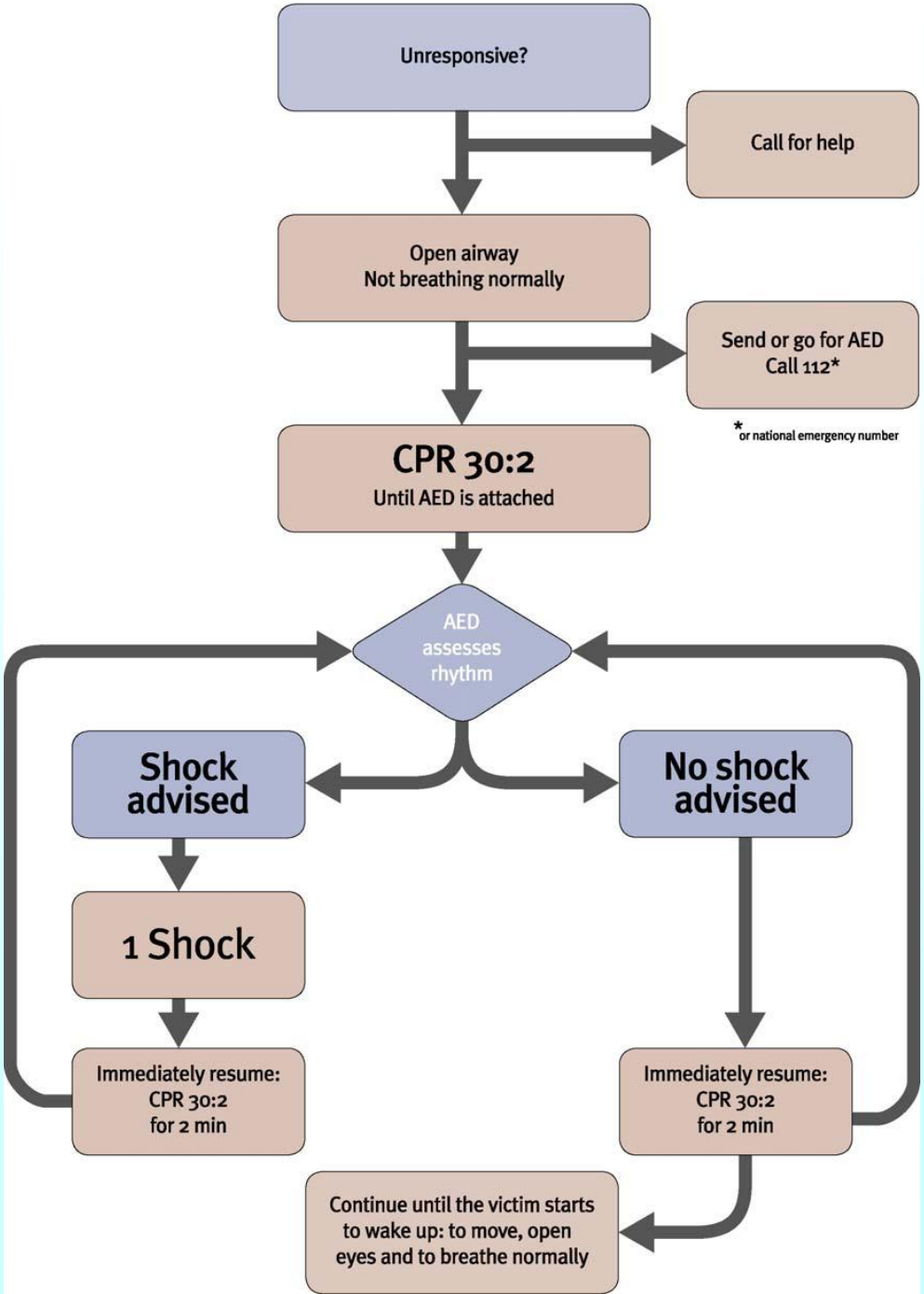


Approach safely
Check response
Shout for help
Open airway
Check breathing
Call 112
Attach AED
Follow voice prompts

BLS children

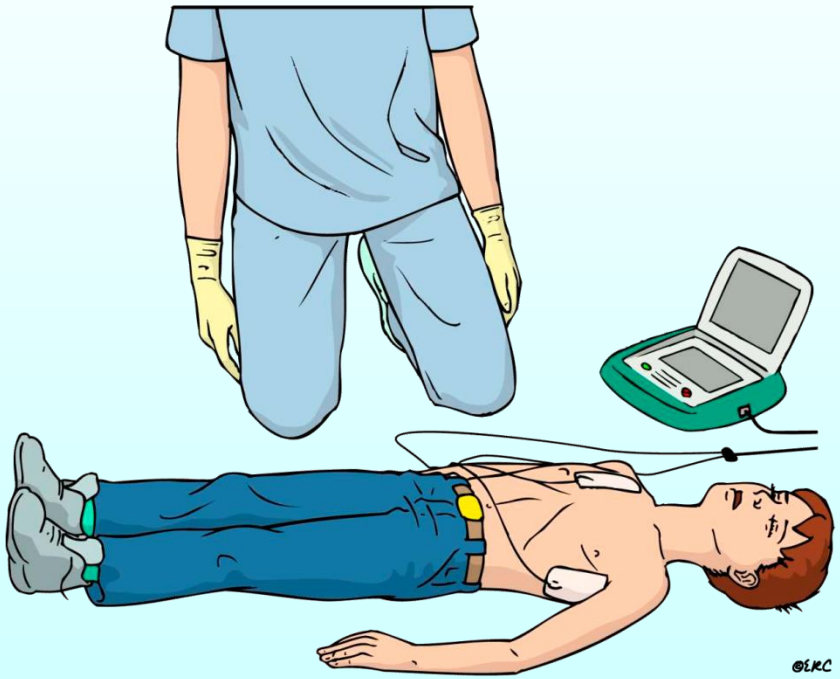
- **Compression/ventilation ratio**
  - **30:2 –** bystanders, single professional
  - **15:2 –** two professionals
- **Ventilation**
  - **5 breaths first**
  - Mouth to nose
  - Mouth to mouth
  - Duration of inspirium 1 – 1,5 s

Automated External Defibrillation Algorithm



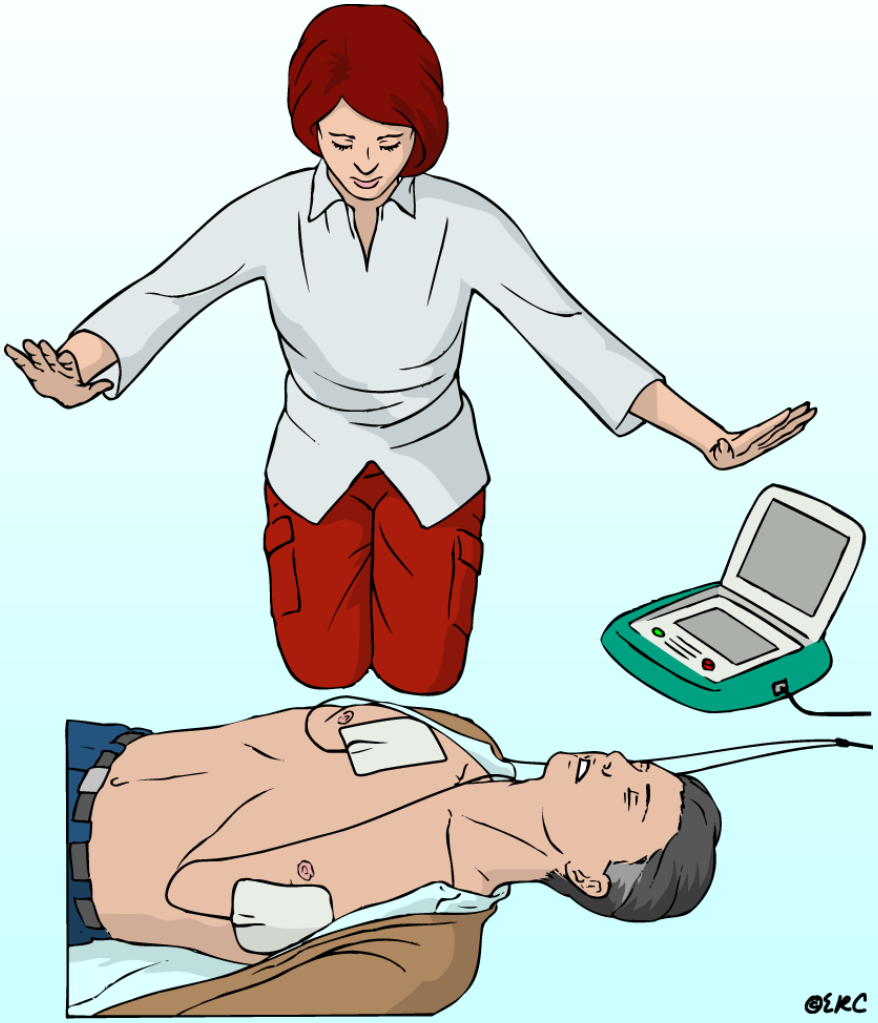
AED - children

- Age > 8 years
  - AED as adult
- Age 1-8 years
  - Use electrodes and device for children if accesible/or adult
- Age < 1 year
  - Use only if safe

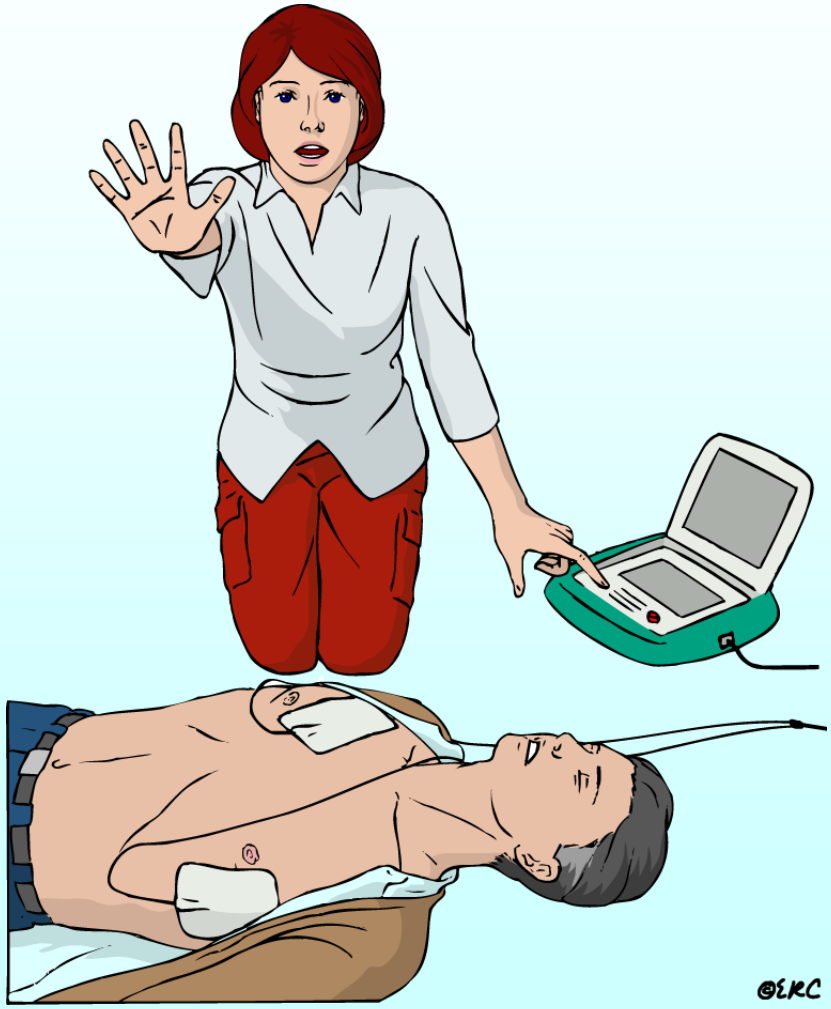


ATTACH PADS TO CASUALTY'S BARE CHEST

ANALYSING RHYTHM
DO NOT TOUCH VICTIM

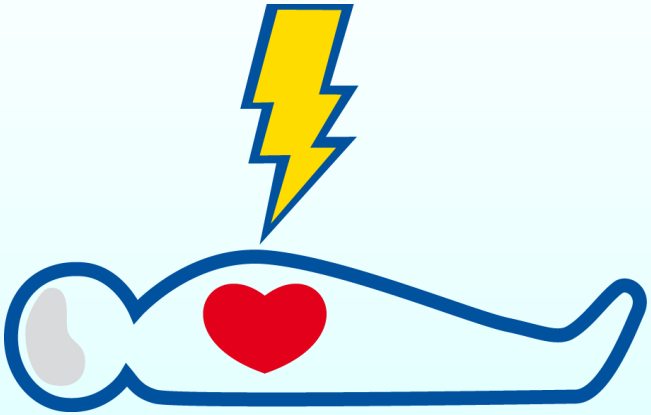


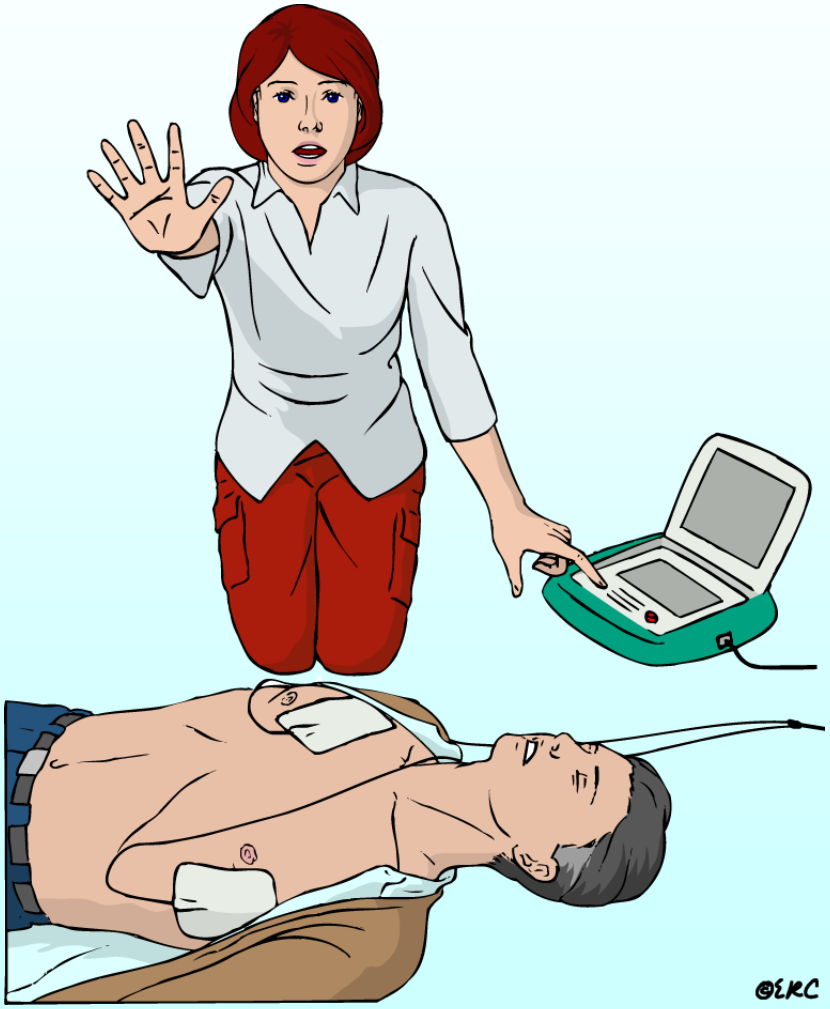
SHOCK INDICATED



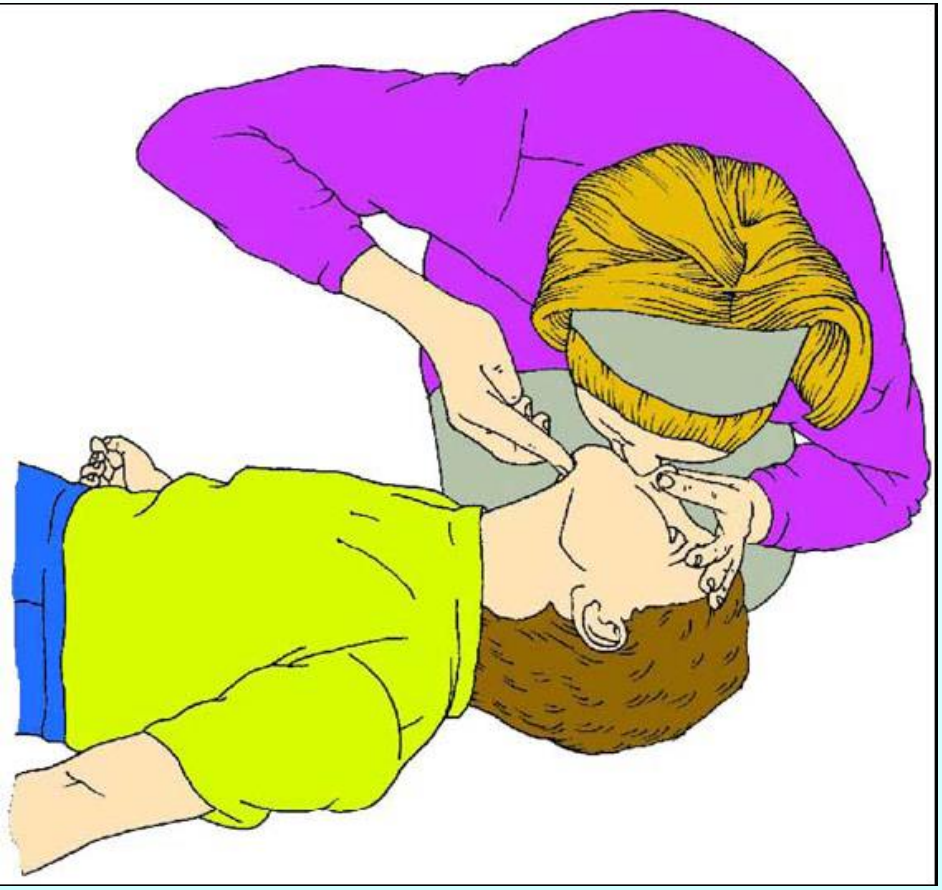
- Stand clear
- Deliver shock

DEFIBRILLATION

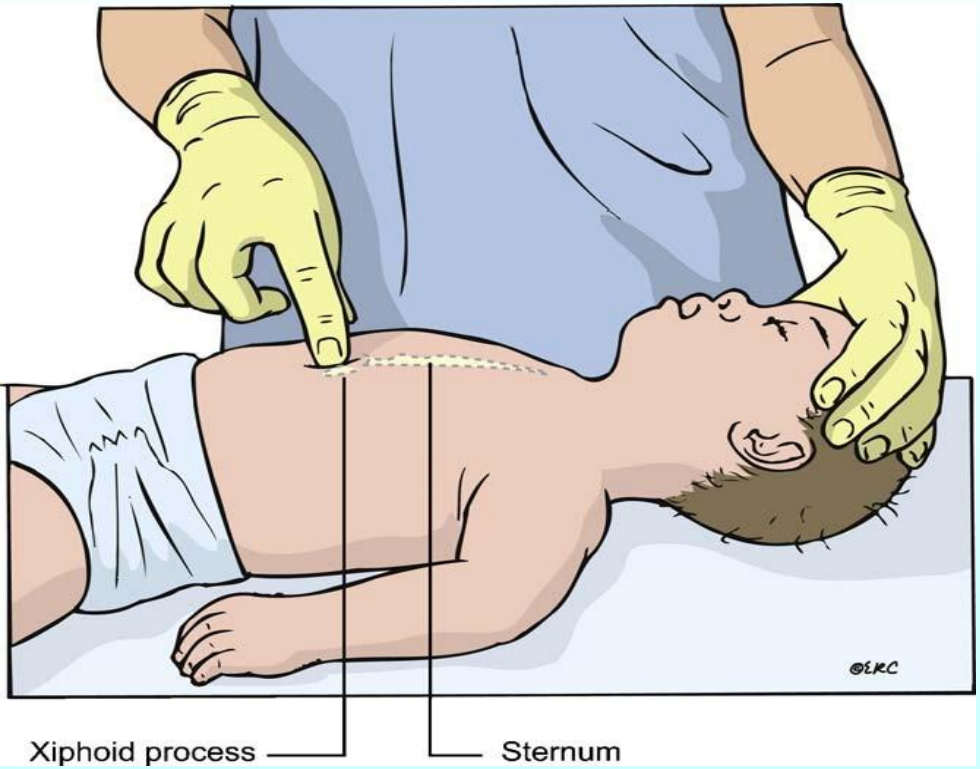




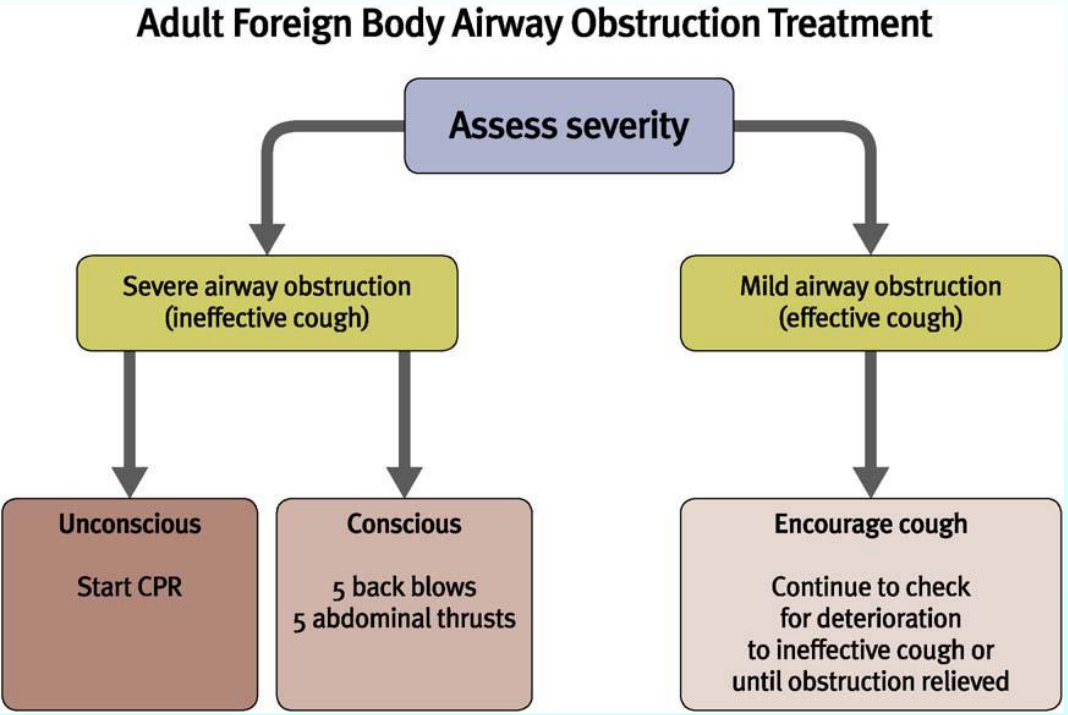
Ventilation

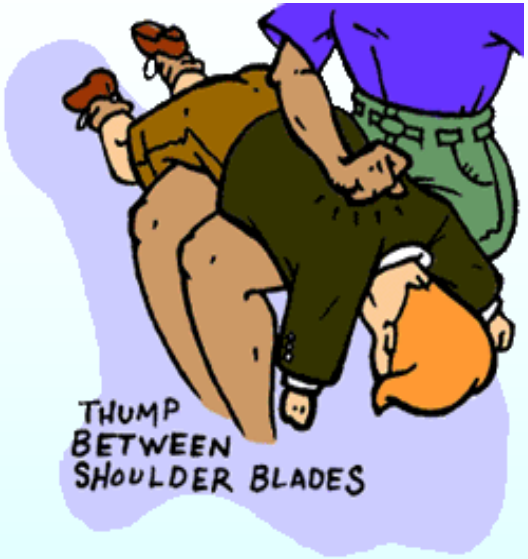


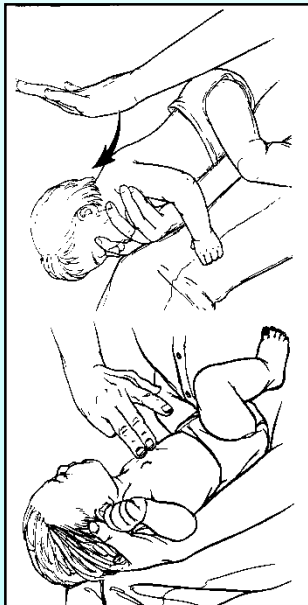
Chest compressions



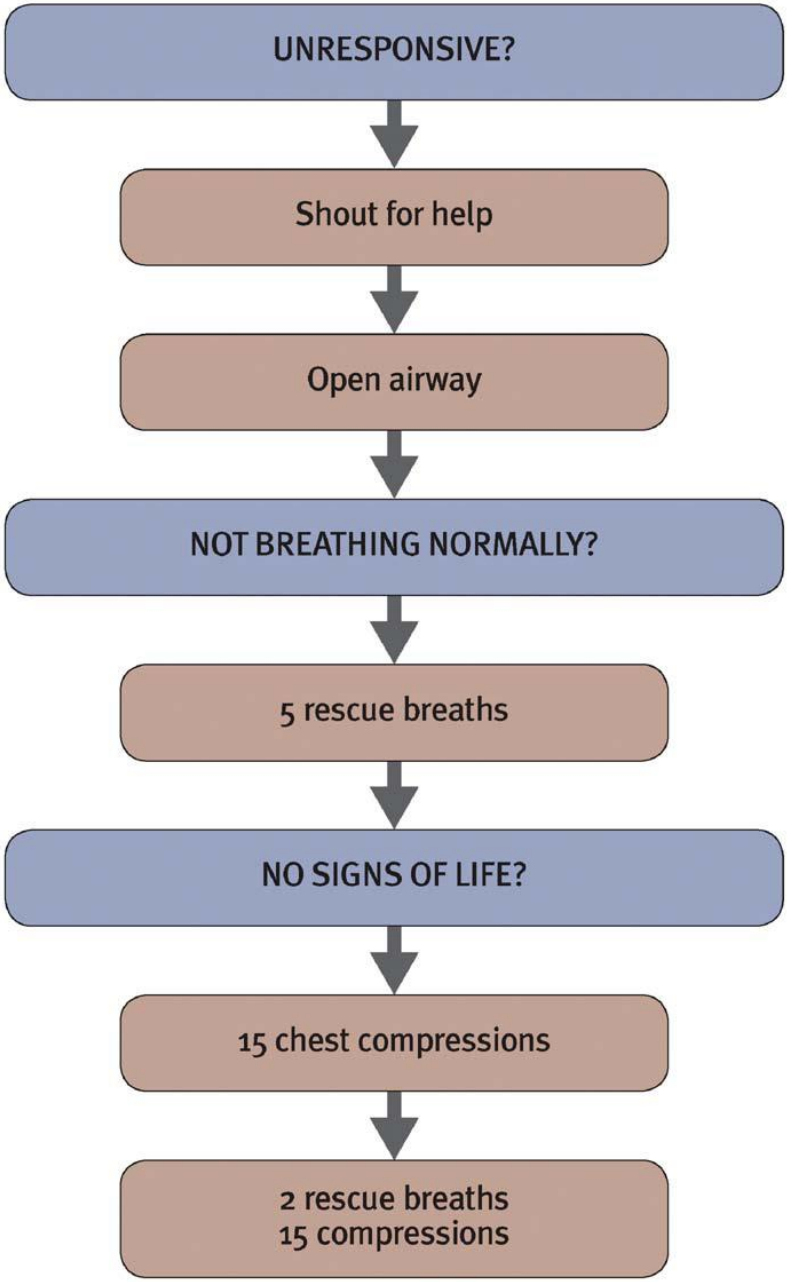
Foreign body obstruction







Paediatric basic life support



BLS children

- look for signs of a circulation:

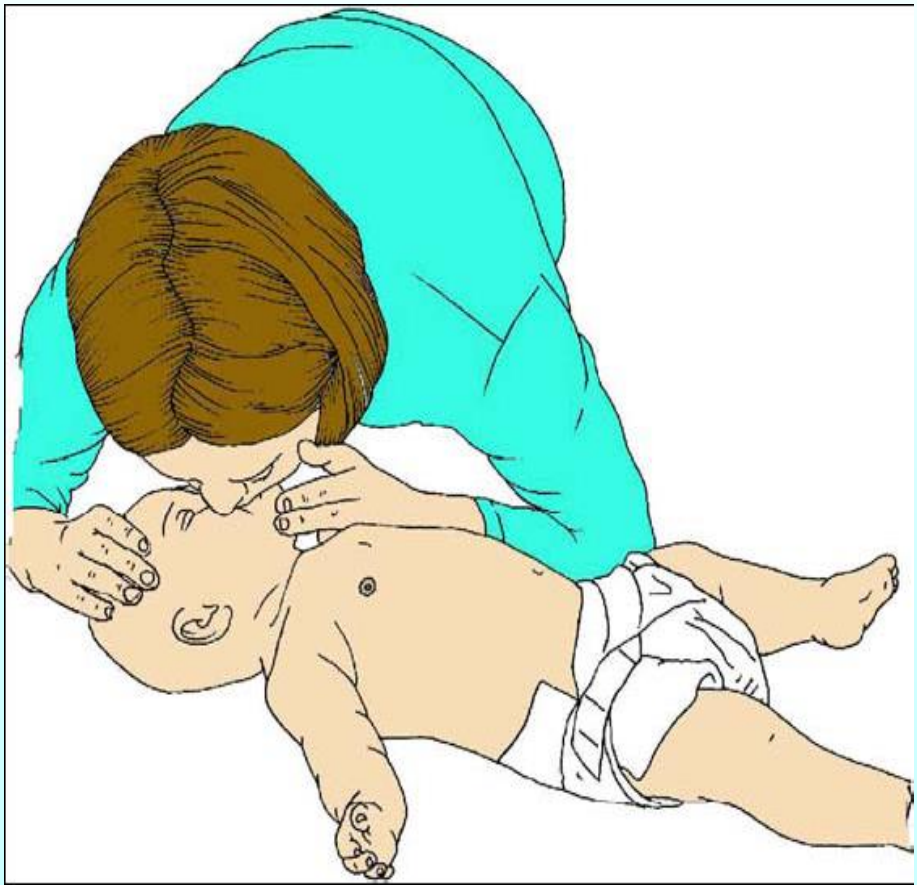
any movement, coughing or normal breathing
(not agonal gasps, which are infrequent, irregular breaths);

BLS children

- 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

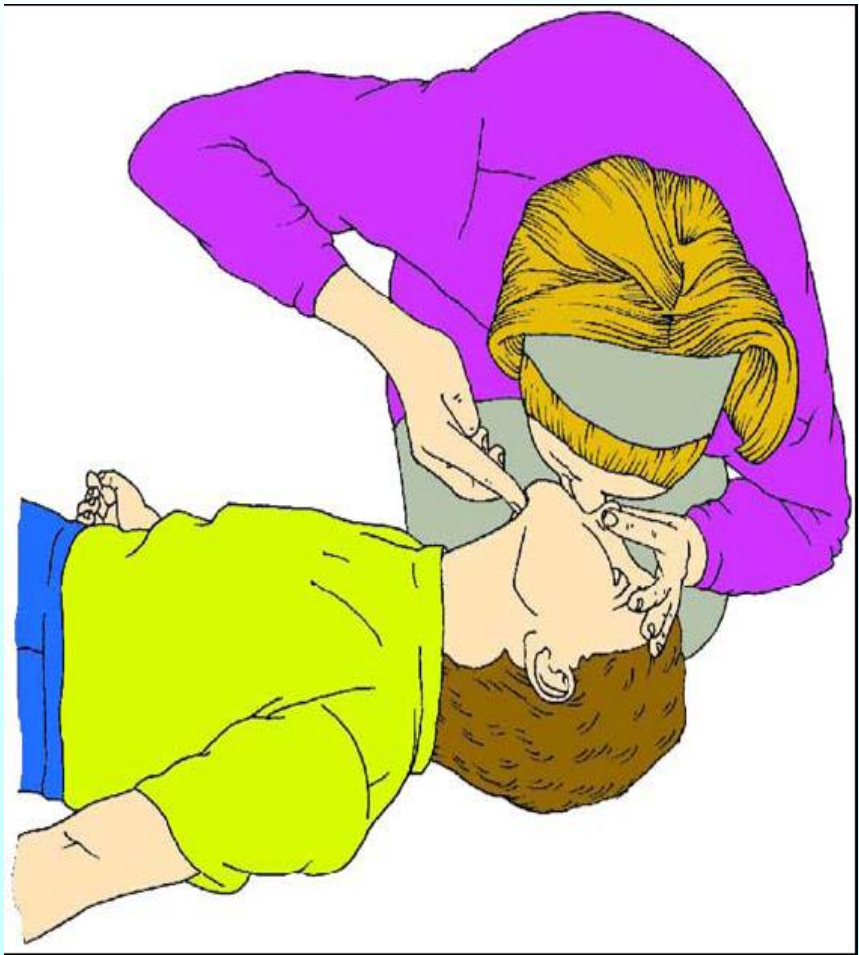


BLS children

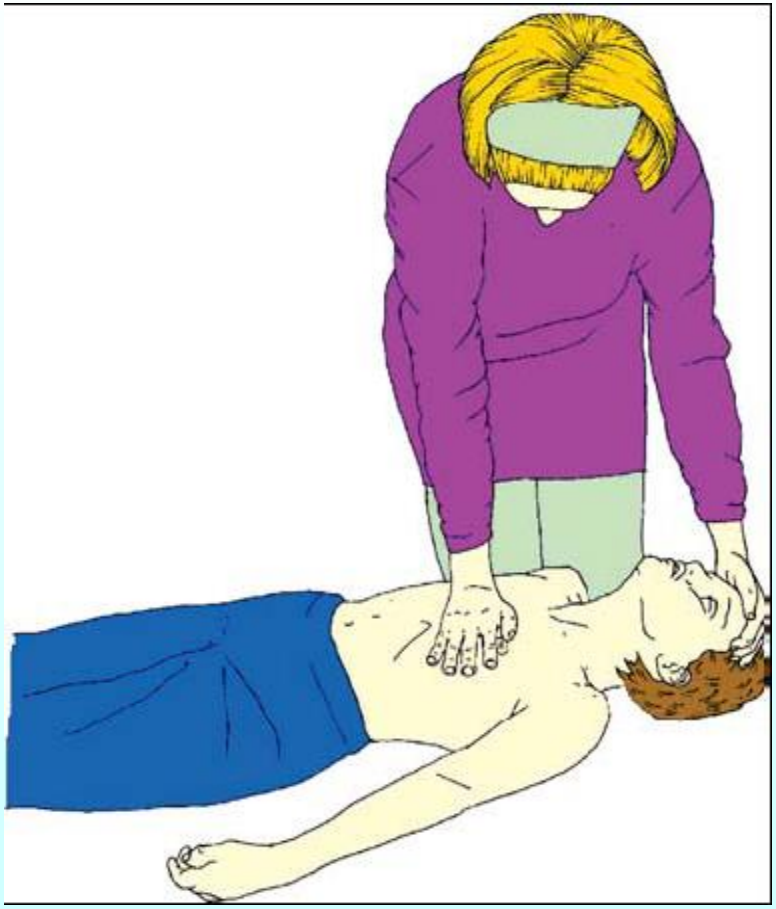
No effective breathing:
- the airway may be obstructed.
• Open the child's mouth and remove any visible obstruction

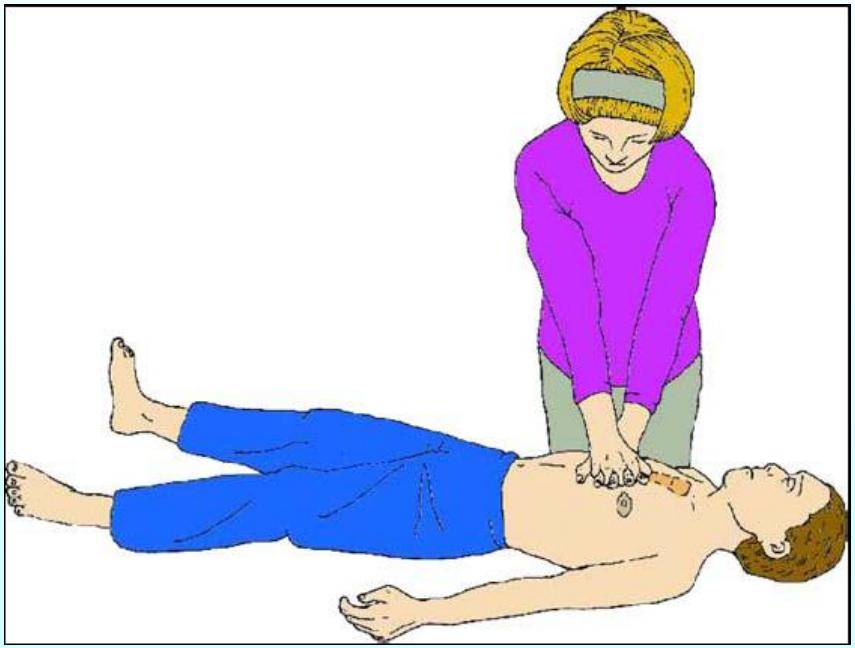
• Ensure that there is adequate head tilt and chin lift airway

• Make up to **five attempts** to achieve effective breaths; if still unsuccessful, move on to chest compressions.

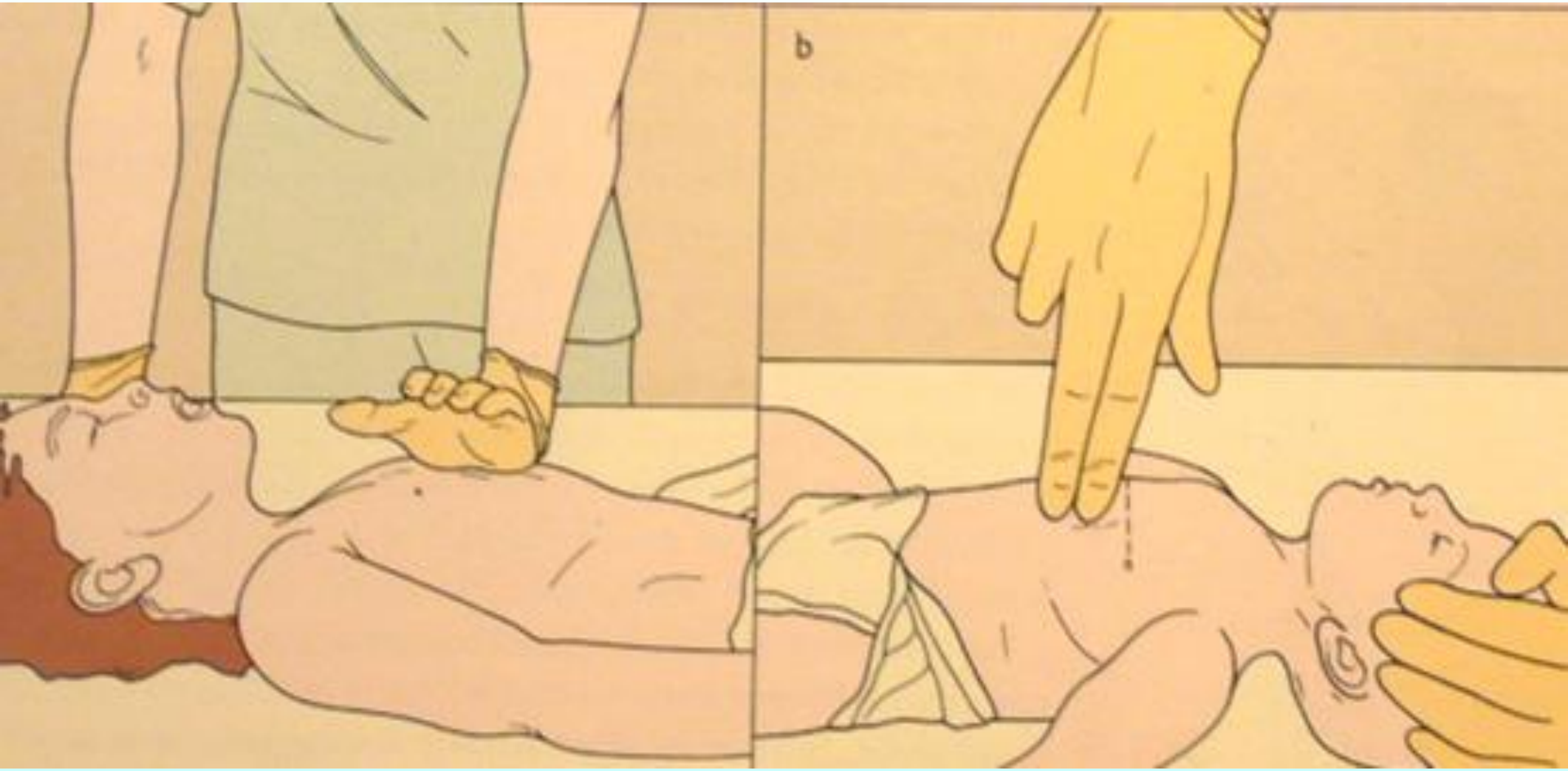


Chest compressions





Chest compressions- children



Newborn resuscitation

Open lungs – Ambu bag with face mask, inspiration

2-3 s

Initial inflation pressure to increase heart rate (HR)

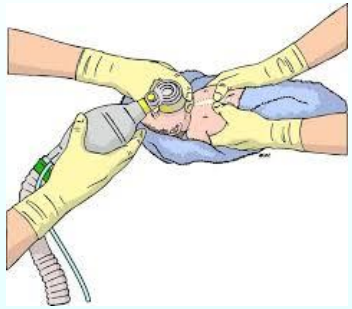
Mature newborn HR minimaly 60 beats /min.
Persistent bradycardia – increase oxygen flow

Meconium – remove only in weak newborn

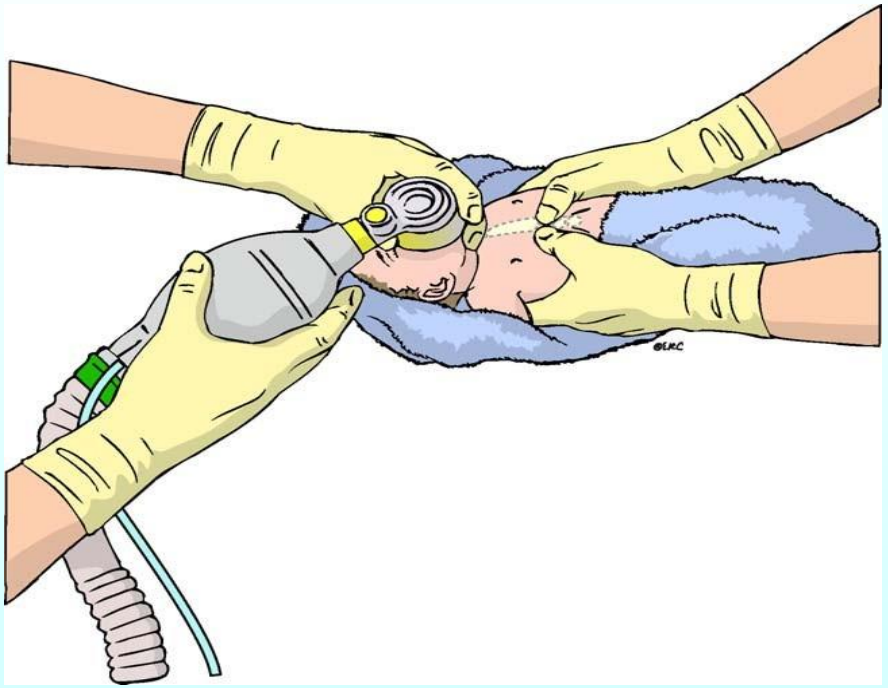
Chest compression to arteficial breaths ratio 3:1
i.e. 90 chest compression : 30 breaths per minute

Check HR every 30 second, STOP when HR > 60/min

Circulatory support succesful only when opened lungs Check temperature (cover, heating lamp)



Newborn resuscitation



Newborn Life Support

Dry the baby
Remove any wet towels and cover
Start the clock or note the time

Birth

Assess (tone),
breathing and heart rate

30 sec

If gasping or not breathing
Open the airway
Give 5 inflation breaths
Consider SpO2 monitoring

60 sec

Re-assess
If no increase in heart rate
Look for chest movement

If chest not moving
Recheck head position
Consider two-person airway control
or other airway manoeuvres
Repeat inflation breaths
Consider SpO2 monitoring
Look for a response

Acceptable pre-ductal SpO2*

2 min : 60%
3 min : 70%
4 min : 80%
5 min : 85%
10 min : 90%

If no increase in heart rate
Look for chest movement

When the chest is moving
If the heart rate is not detectable or slow (< 60)
Start chest compressions
3 compressions to each breath

Reassess heart rate
every 30 seconds
If the heart rate is not detectable or slow (< 60)
Consider venous access and drugs

* www.pediatrics.org/cgi/doi/10.1542/peds.2009-1510

AT ALL STAGES ASK: DO YOU NEED HELP?


Thanks for attention