Chain of survival

Advanced Life Support - Guidelines 2015 (ACLS)

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ARK, FN u sv. Anny

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Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

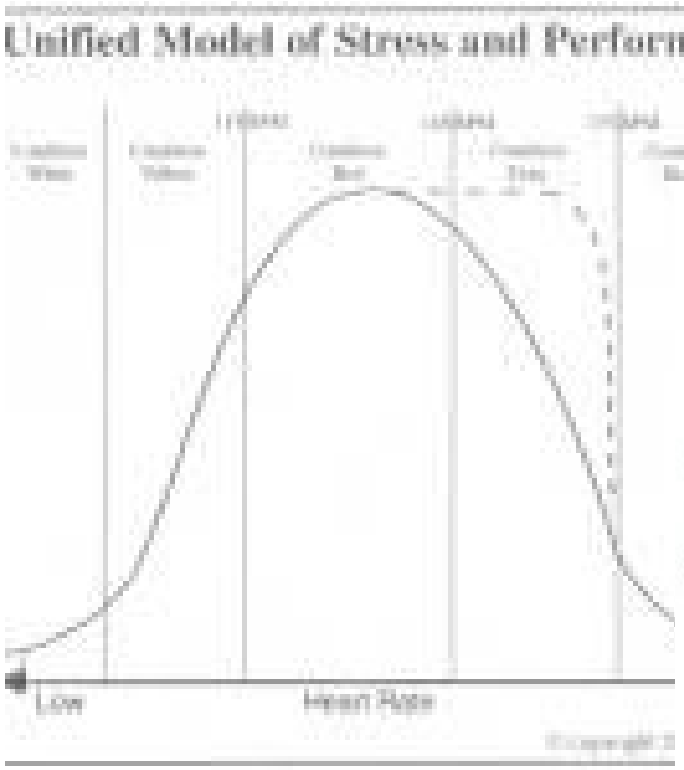
Success in CPR / crisis

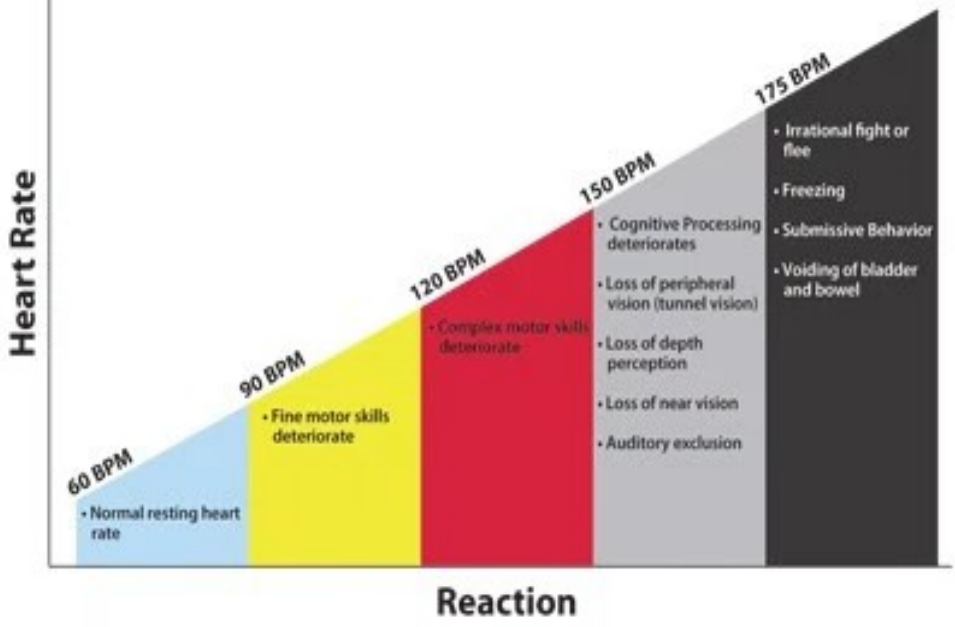
- technical skills:
  -
  -
  -
  -
  -
- non-technical skills

Success in CPR / crisis

- technical skills:
  - algorithm = plan
  - airway management
  - compressions
  - drugs (O2, Epi, amiodaron..)
  - care after ROSC
- **non-technical skills**
  - communication

Stress





additional effect

Communication

"To say" doesn't mean
"to hear".

"To hear" does not mean
„to understand“.

„To understand“ does not mean
"to do"

P. give epinephrine!
… Epinephrine is given.

Action linked phrases

- No consciousness

- No puls
- VF
- Shock delivered
- asystoly/PEA
- ROSC

Hunt E.A.,et al. A novel approach to life support training using “action-linked phrases”, Resuscitation, Vol.86, January 2015, 1-5; https://doi.org/10.1016/j.resuscitation.2014.10.007

Debriefing

- Thanks
- Emotions
- Questions

+ Δ

Feedback for the future

Success in CPR / crisis

- technical skills:
  - **algorithm = plan**
  - airway management
  - compressions
  - drugs (O2, Epi, amiodaron..)
  - care after ROSC
- non-technical skills
  - communication

Primary survay

D

R

'

S

A

B

C

D

E

Primary survay (Primární vyšetření)

- Danger
- Response
  '
- Send for HELP

- Airway
- Breathing
- Circulation
- Disability
- Exposure / everything else

Danger


corrosive
+electrical hazard
explosive
www.visualdictionaryonline.com
+flammable
+radioactive
poison

A+B+C in 10s?

healthcare staff cannot assess the breathing and pulse sufficiently reliably to confirm cardiac arrest.[278–287]

A+B+C in 10s?

healthcare staff cannot assess the breathing and pulse sufficiently reliably to confirm cardiac arrest.[278–287]

- Delivering chest compressions to a patient with a beating heart is unlikely to cause harm.[294] However, delays in diagnosing cardiac arrest and starting CPR will adversely effect survival and must be avoided.

- Only those experienced in ALS should try to assess the carotid pulse whilst simultaneously looking for signs of life. This rapid assessment should take no more than 10 s. Start CPR if there is any doubt about the presence or absence of a pulse.

e | OMV.cz

https://www.omv.cz/cs-cz

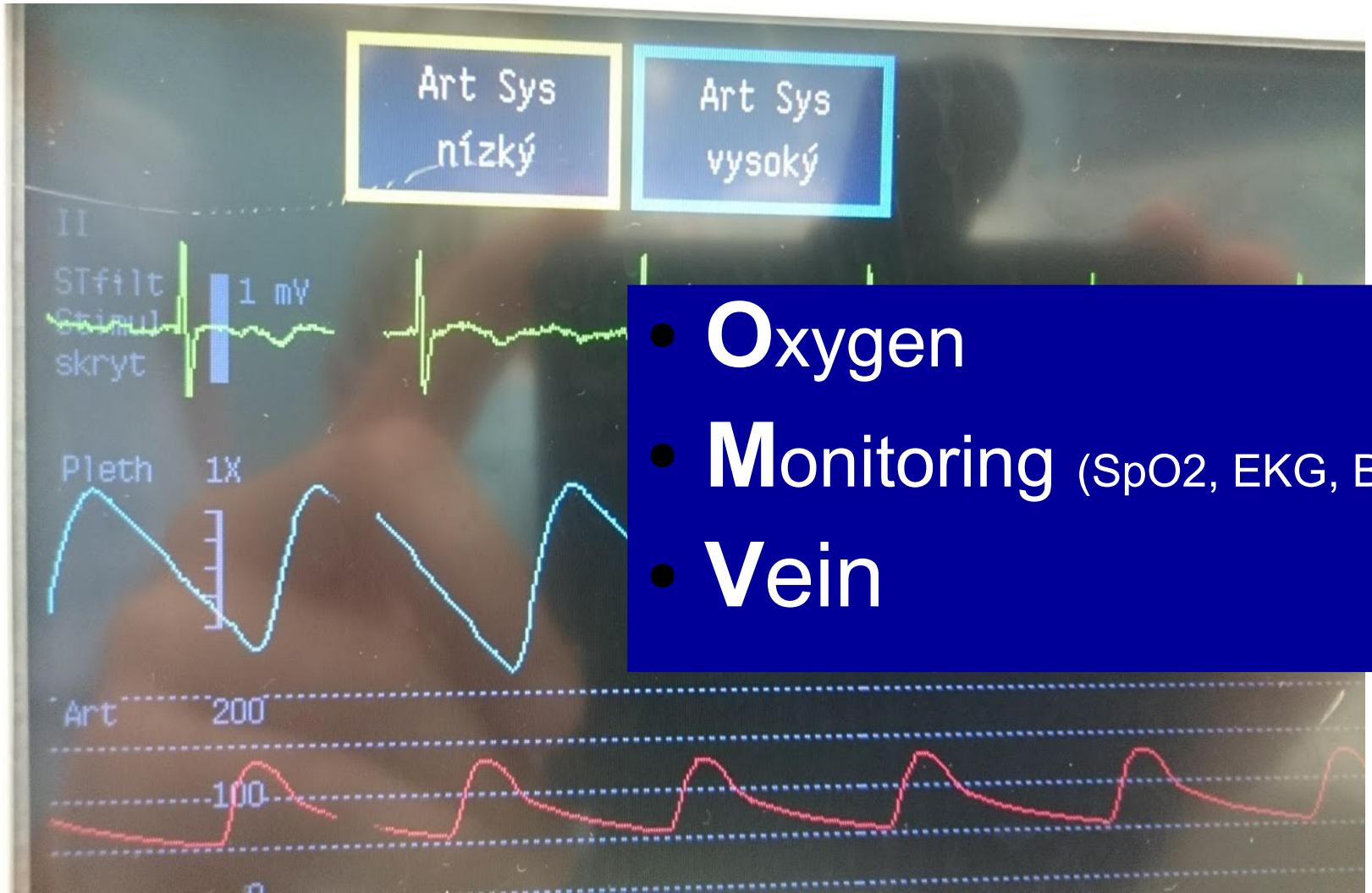
Bookmarks | zalozky IS | detiNase | ČHMÚ | kytky | FNUSA | auto | Discovery MU | YouTube | Seznam - najdu tam, | Skylink Live TV živě n

Čerpací stanice | Firemní zákazníci | O OMV

Energie na lepší život. OMV

- **O**xygen
- **M**onitoring (SpO2, EKG, BP)
- **V**ein

Alive ?

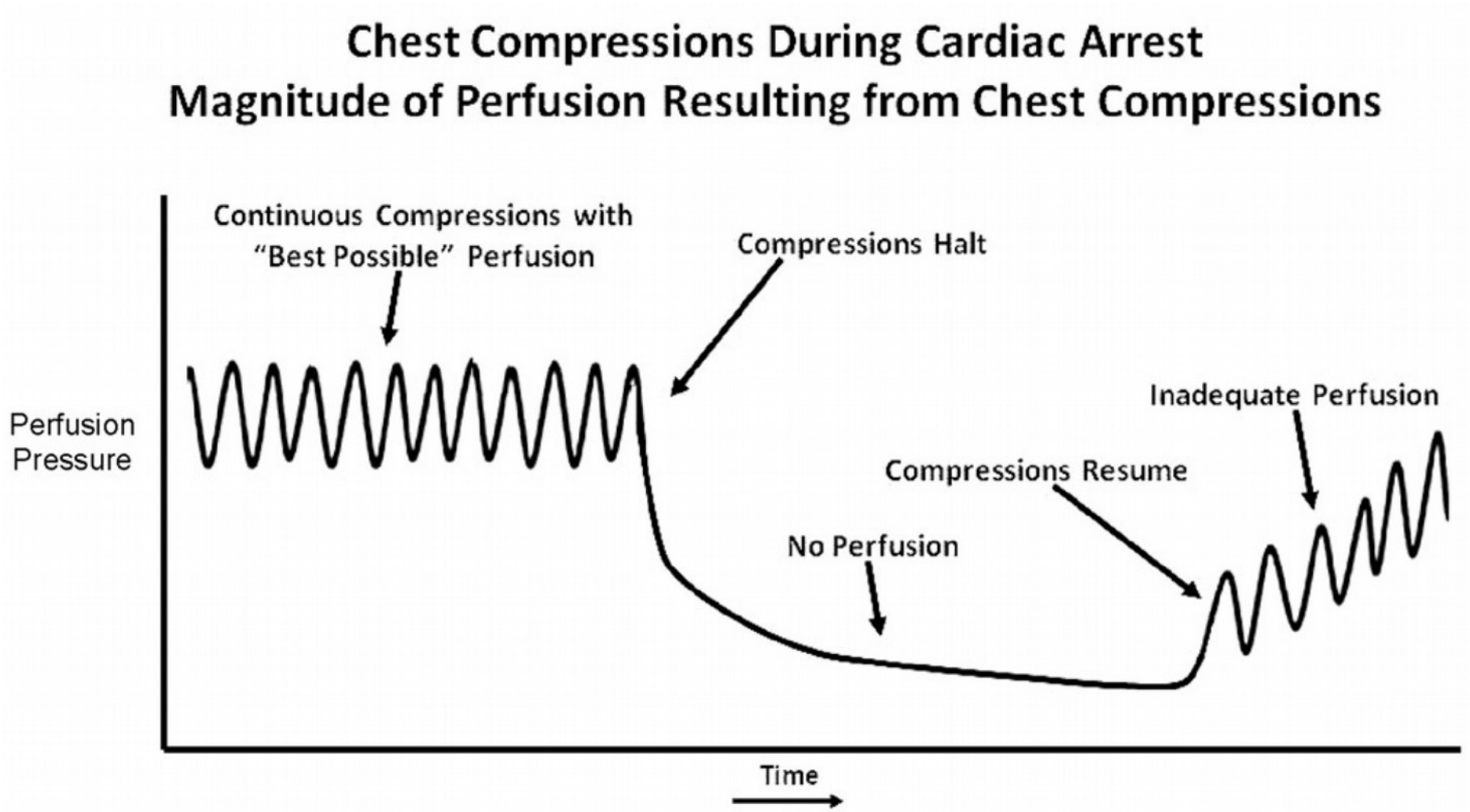


- **O**xygen
- **M**onitoring (SpO2, EKG, BP)
- **V**ein

Success in CPR / crisis

- technical skills:
  - algorithm = plan
  - airway management
  - **compressions**
  - drugs (O2, Epi, amiodaron..)
  - care after ROSC
- non-technical skills
  - communication

Compressions



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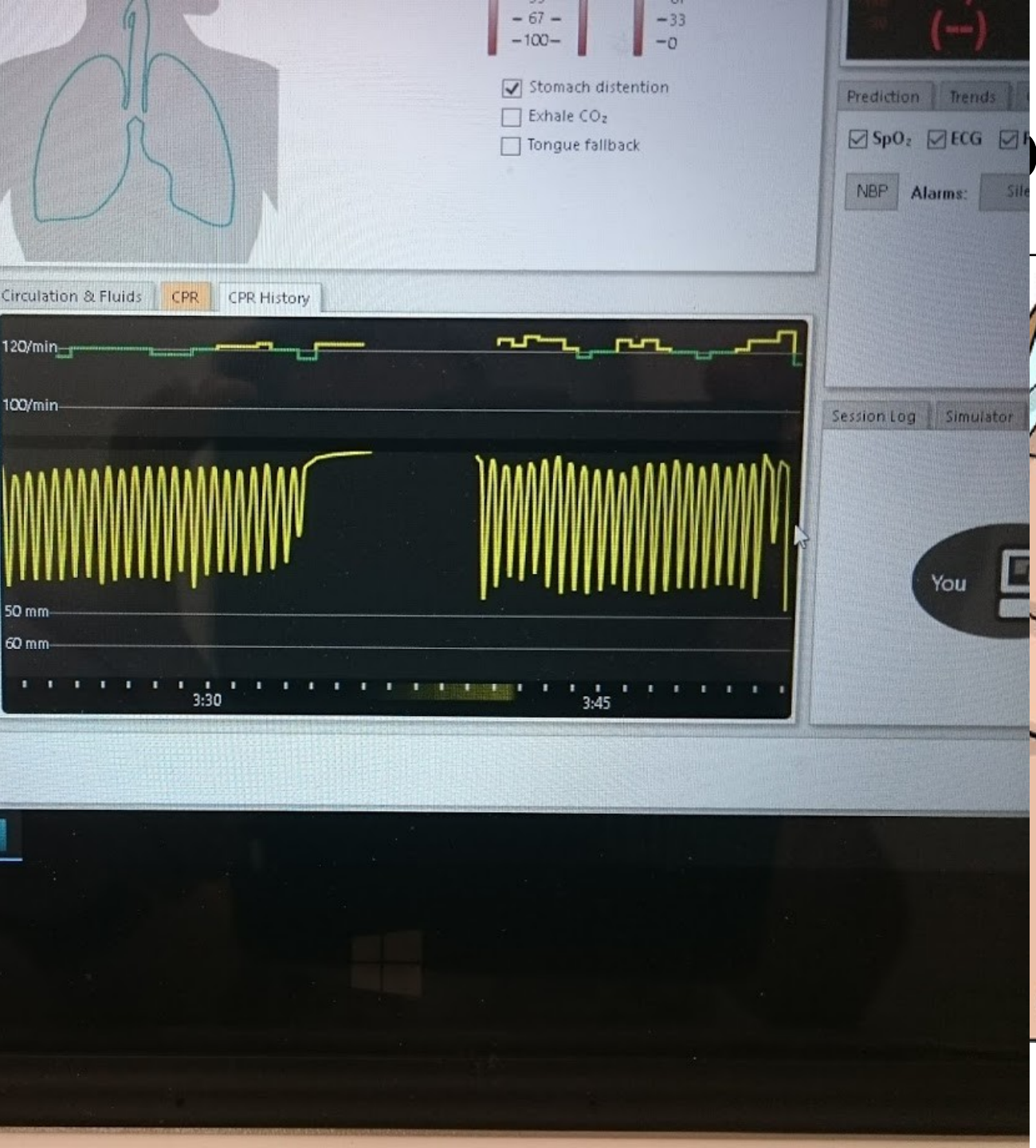
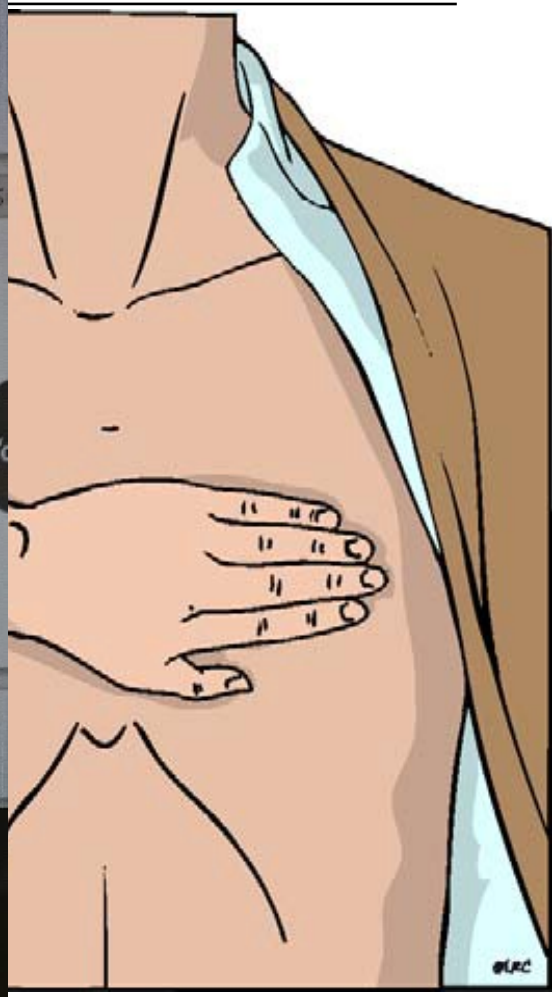

Stomach distention
Exhale CO_2
Tongue fallback
Prediction
Trends
SpO_2
ECG
NBP
Alarms:
Circulation & Fluids
CPR
CPR History
120/min
100/min
50 mm
60 mm
3:30
3:45
Session Log
Simulator
You

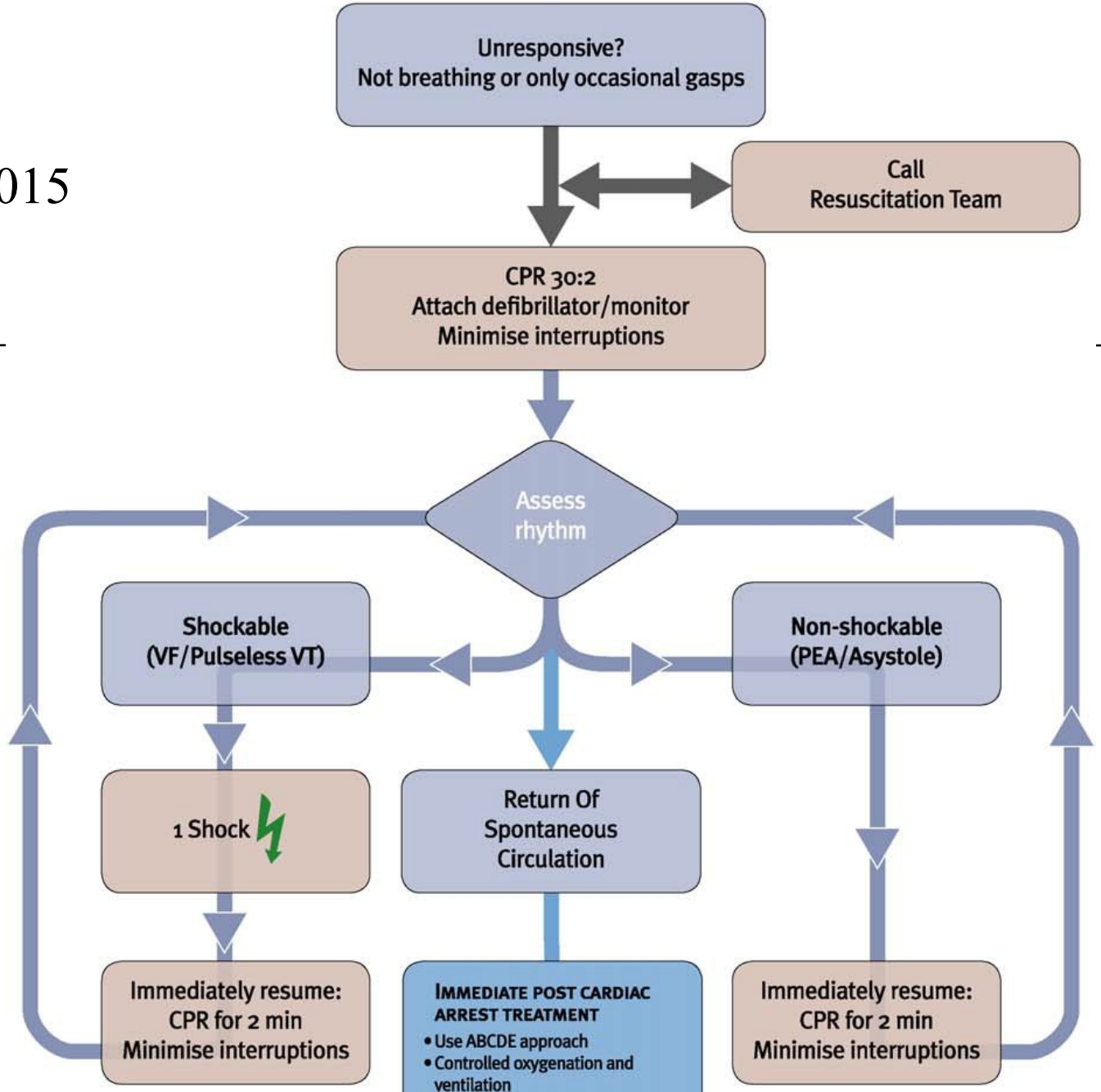
S

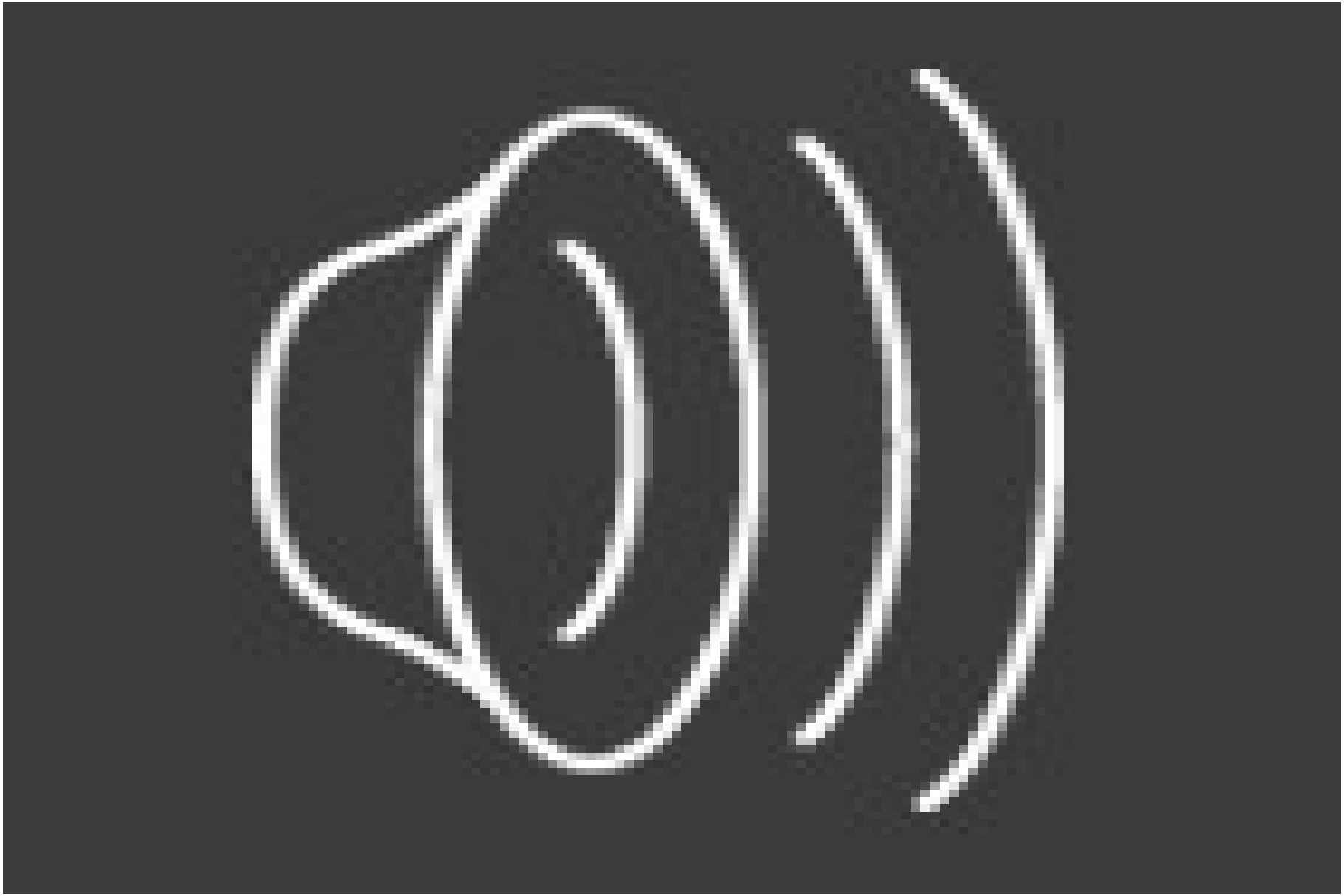
Change regularly



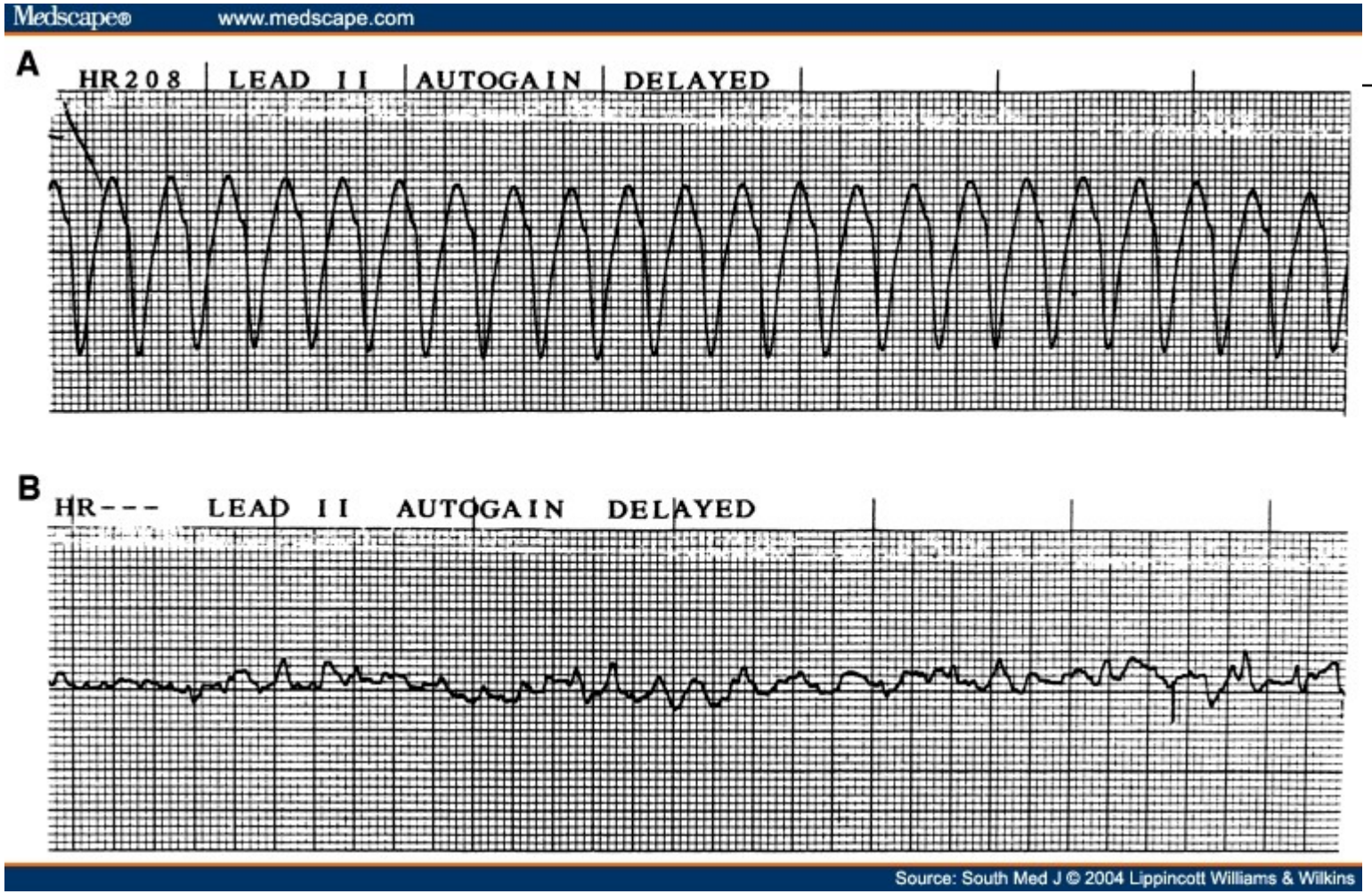
Advanced Life Support

2010..2015





VF/ VT


Medscape®
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A
HR208 | LEAD II | AUTOGAIN | DELAYED
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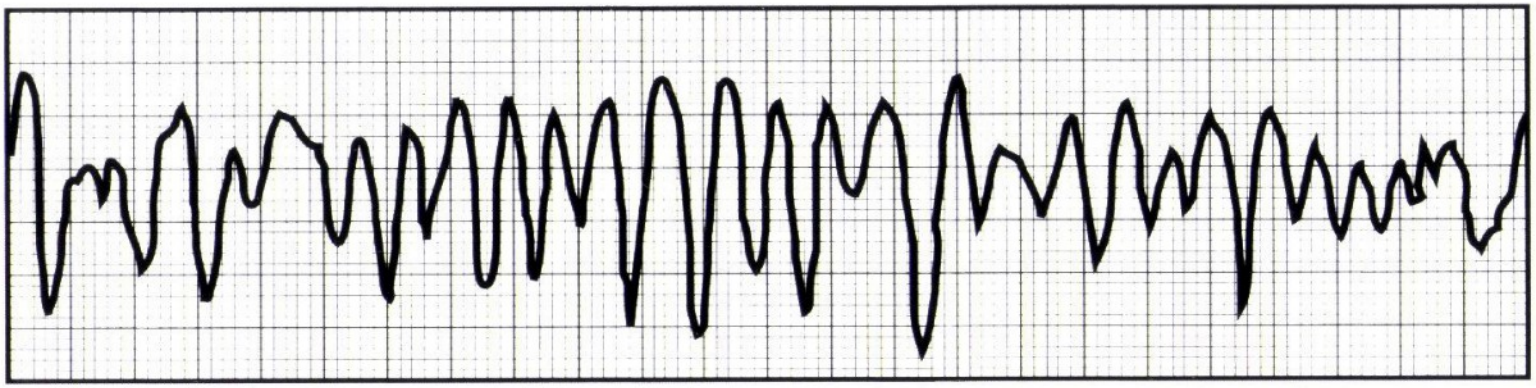
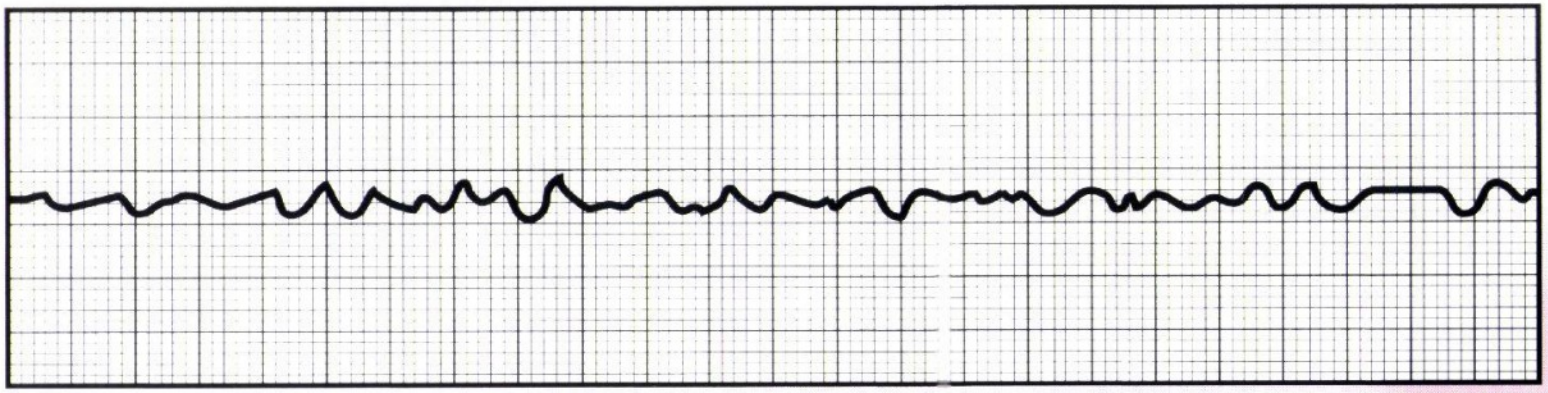
HR--- LEAD II AUTOGAIN DELAYED
Source: South Med J © 2004 Lippincott Williams & Wilkins

VENTRICULAR Fibrillation

Hrubovlnná komorová fibrilace



Jemnovlnná komorová fibrilace



Ventricular fibrillation

- electrical instability of heart muscle (ischemia, hypothermia)

sings:

- pulselessness

Th: defibrillation,

adrenalin, (vasopressin)

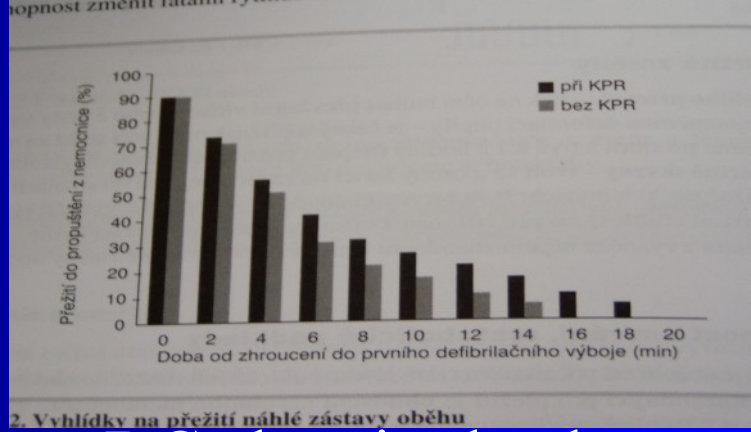
Amiodarone after 3rd shock

Please Shock-Shock-Shock, EVerybody Shock,
And Let's Make Patients Better

- (Please = precordial thrump)
- Shock 200J bifasic / 360J mono
- EVerybody = Epinephrine / Vasopressin

- And = Amiodarone
- Let's = Lidocaine
- Make = Magnesium
- (Patients = Procainamide)
- Better = Bicarbonate

Defibrillation



2. Vyhlídky na přežití náhlé zástavy oběhu

- Defibrillation sends a high energy DC electric shock through the heart, stopping it momentarily. The sinoatrial node should then take over and a coordinated rhythm restart. However, ventricular fibrillation often recurs so multiple shocks are used routinely.

Position of electrodes:

Energy:

Joule (Watt × sec.)

heard - ONLY 4%/

monophasic shock

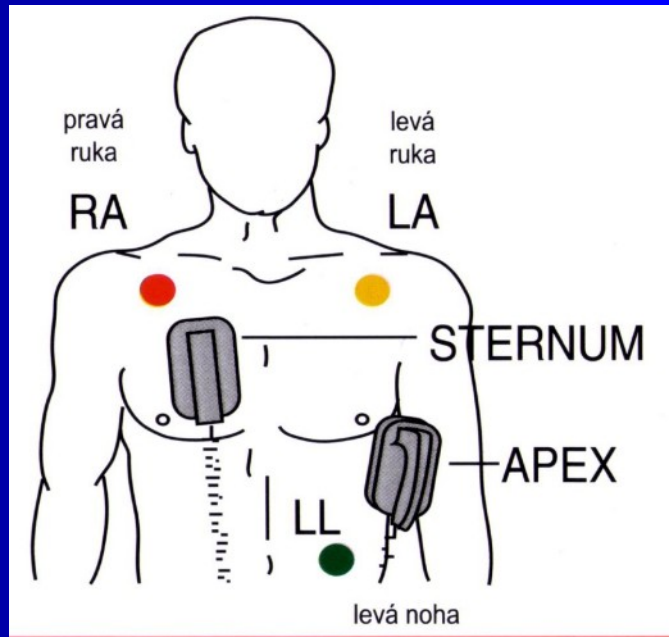
360 J

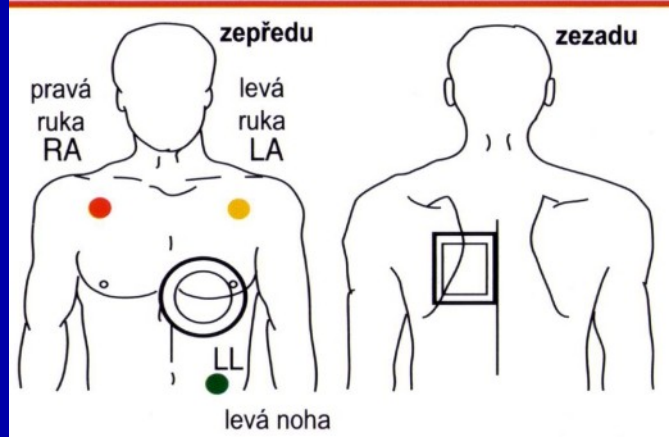
biphasic shock

200 – 300 - 360J

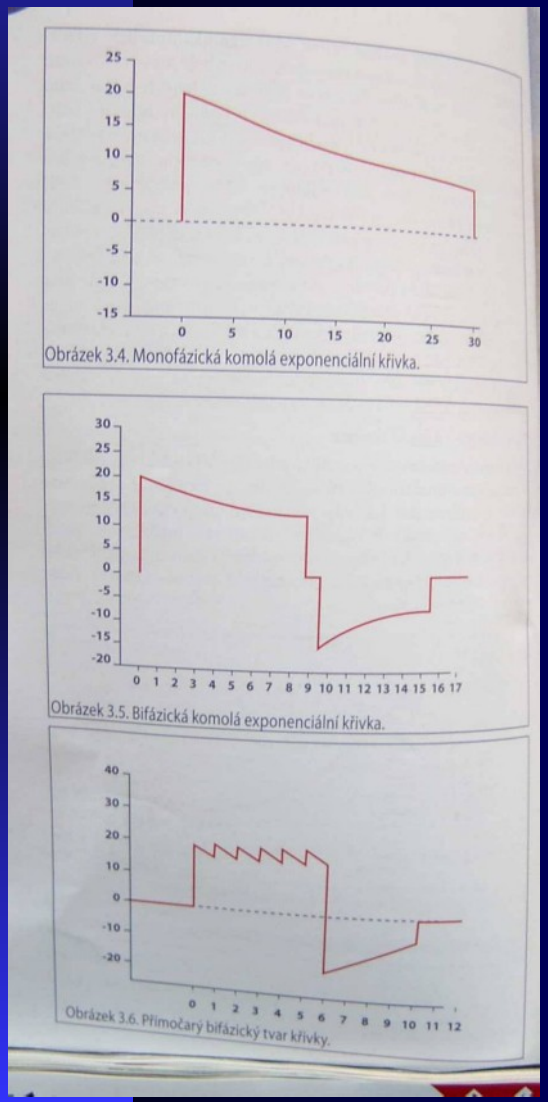
internal shock

25 - 35 J





Biphasic versus monophasic



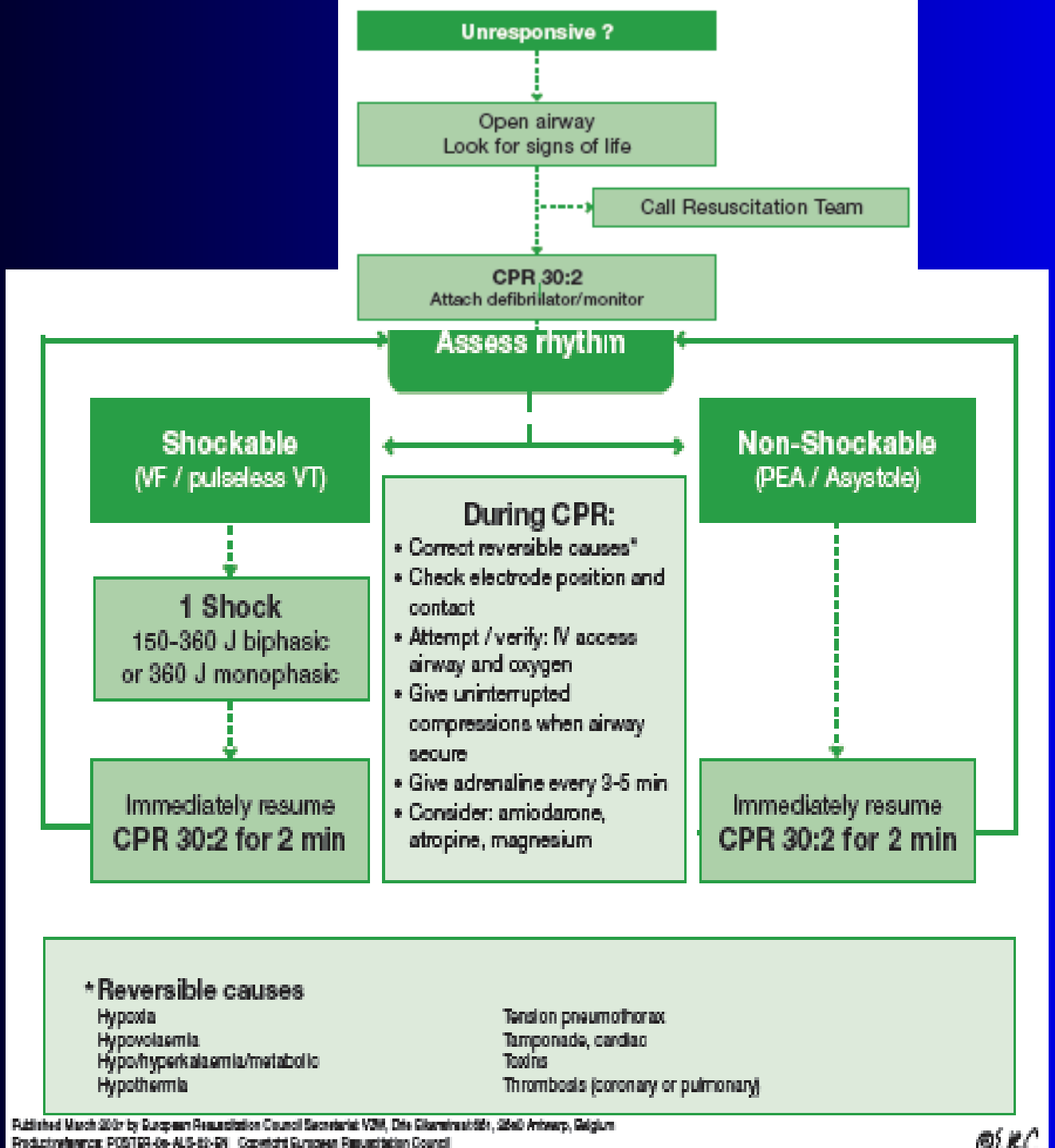
- Monophasic defibrillation delivers a charge in only one direction.

- Biphasic defibrillation delivers a charge in one direction for half of the shock and in the electrically opposite direction for the second half.

Defibrillation

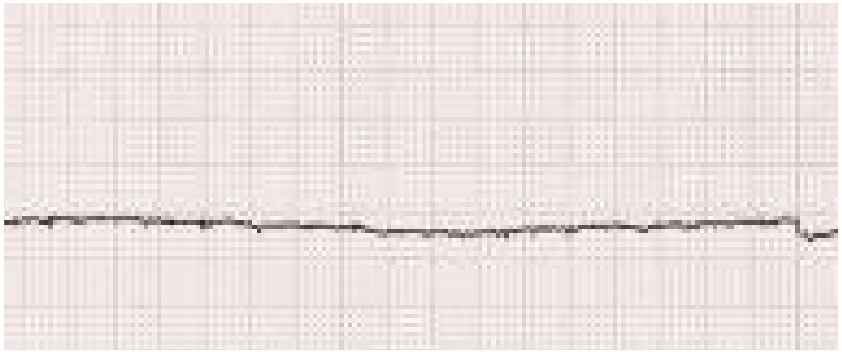
Voltage 1,5 – 3 kV
Current 30 – 40 A
Time 15 ms
Impedance of Th 70 – 80 ohms

- **Skin burns**
- **"stand clear" order**


Unresponsive ?
Open airway
Look for signs of life
Call Resuscitation Team
CPR 30:2
Attach defibrillator/monitor
Assess rhythm
Shockable
(VF / pulseless VT)
Non-Shockable
(PEA / Asystole)
1 Shock
150-360 J biphasic
or 360 J monophasic
During CPR:
• Correct reversible causes*
• Check electrode position and contact
• Attempt / verify: IV access airway and oxygen
• Give uninterrupted compressions when airway secure
• Give adrenaline every 3-5 min
• Consider: amiodarone, atropine, magnesium
Immediately resume
CPR 30:2 for 2 min
Immediately resume
CPR 30:2 for 2 min
*Reversible causes
Hypoxia
Hypovolaemia
Hypo/hyperkalaemia/metabolic
Hypothermia
Tension pneumothorax
Tamponade, cardiac
Toxins
Thrombosis (coronary or pulmonary)

Asystole

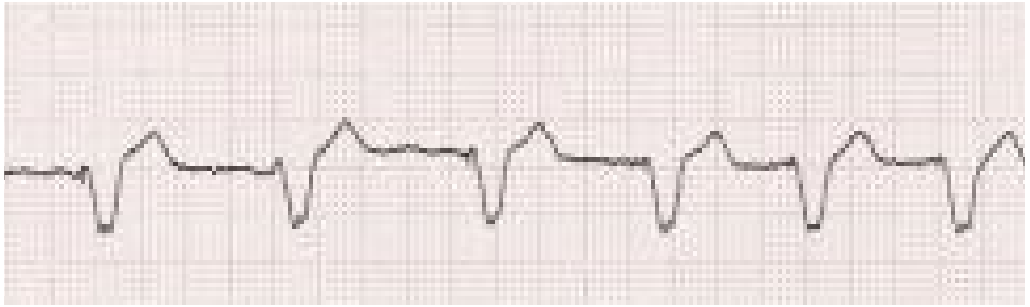
- isoelectric line



Pulseless Electrical Activity

(bezpulzová elektrická aktivita = elektromechanická disociace)

- complex, line, complex



Asystole

The worst situation

- **Diagnosis on ECG monitor – flat line**
- **Airway management - hypoxia**
- **Adrenalin 1 mg i.v. á 3 min.**

  children 10 μg/kg

Asystole ..... Check me in another lead, then let's have a cup of TEA."

- ((T = Transcutaneous Pacing)) ex 2005
- E = Epinephrine
- ((A = Atropine)) ex 2010

Pulseless Electrical Activity reasons:

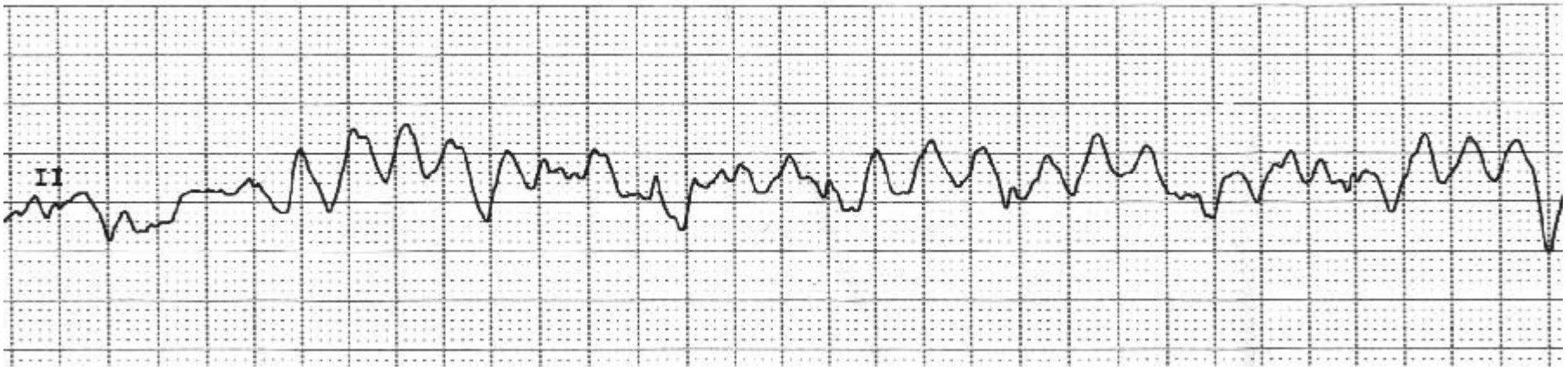
- Hypovolemia
- Hypoxia
- H^+ acidosis
- Hyper/hypocalemia
- Hypothermia

PEA - reasons:

- „**T**ablets“ (overdose)
- **Cardiac T**amponade
- **T**ension pneumothorax
- **T**rombosis of C.a.
- **T**rombosis of a.pulm. (embolie)

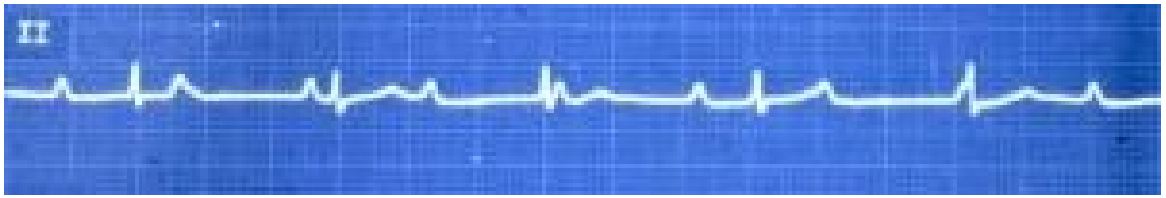
Pulseless electrical activity are guided by the letters P-E-A

- Problem (H, T)
- Epinephrine
- (atropin) ex2010


II

Co je to?

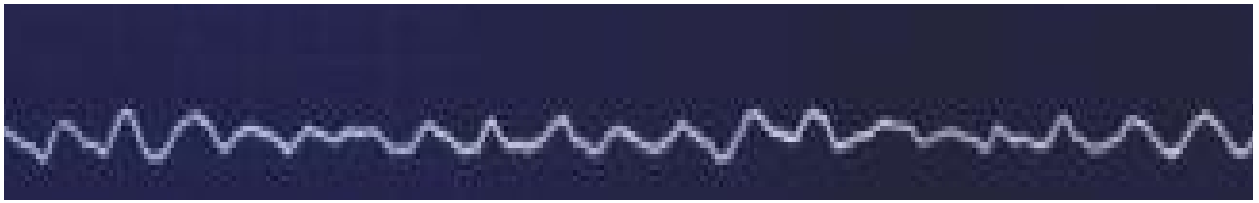
Co je to?



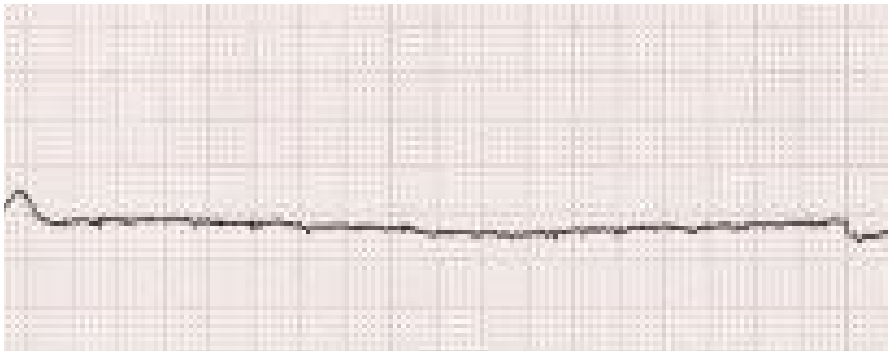
Co je to?

Co je to?

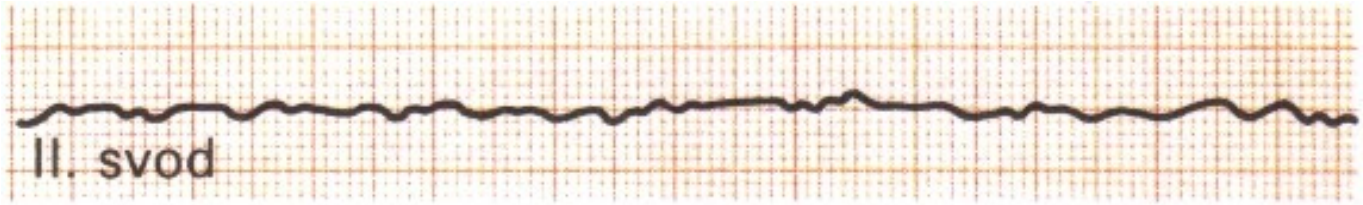
Co je to?



Co je to?

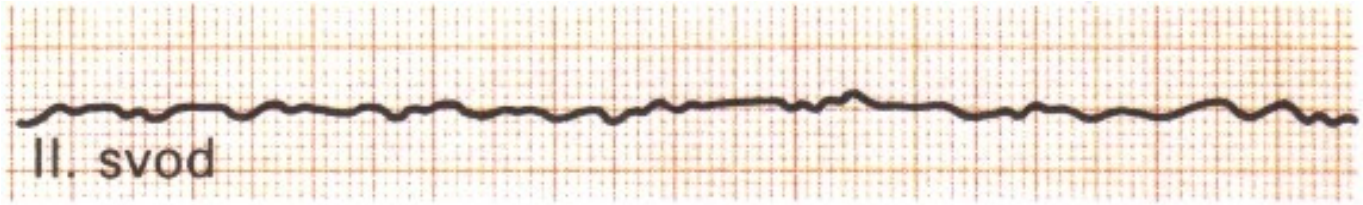


Asystole ??
low amplitude VF ??



Asystole ??
low amplitude VF ??

- if in doubt - asystoly



B – breathing ACLS

positive pressure ventilation

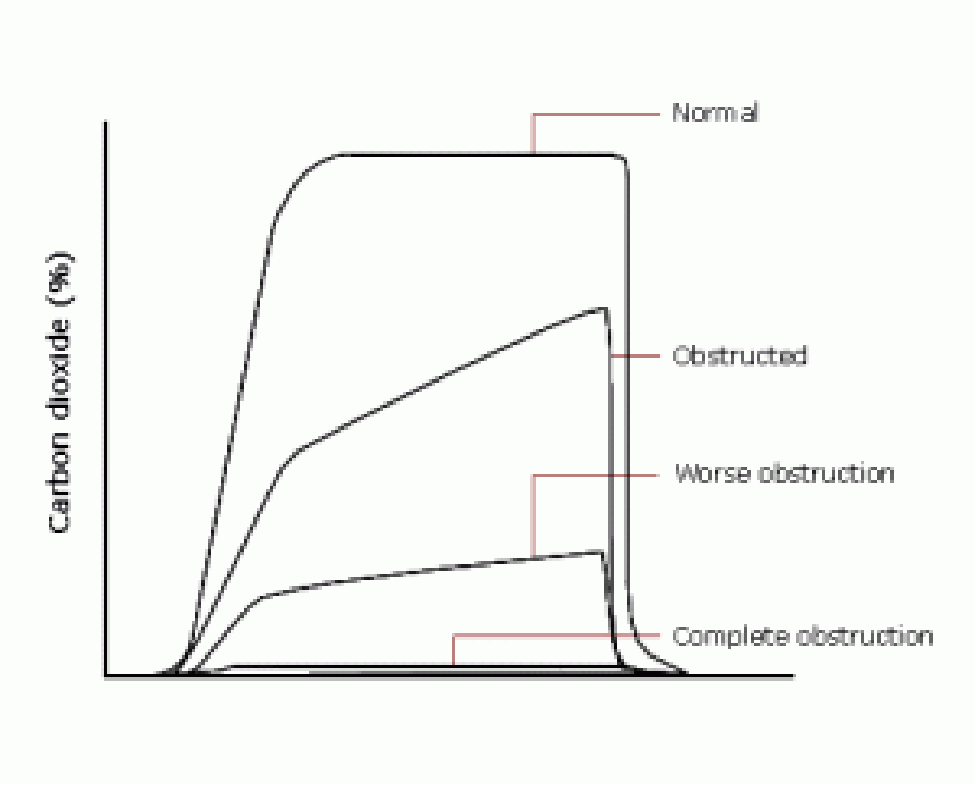
- bug („ambu“), holding mask by 1 or 2 hands
- (ventilator – Volume Control Ventilation)
- 6 ml/kg; 10/min, fiO2 100%
- ACLS 2 breaths
- ratio – 2 : 30 - ventilated by mask
  “no ratio” = 10 : 100 – advanced airway

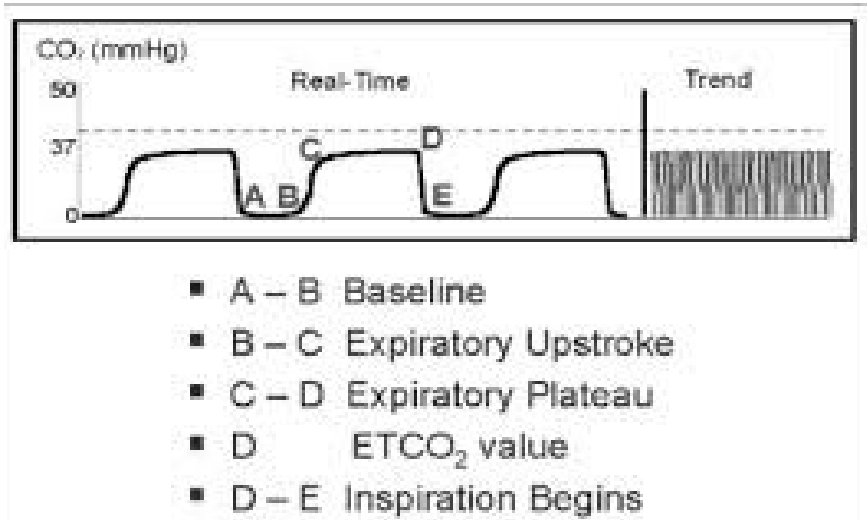
Advanced Airway

100% O2, flow 10lpm

Supraglotic devices:

Capnography





- A – B Baseline
- B – C Expiratory Upstroke
- C – D Expiratory Plateau
- D $ETCO_2$ value
- D – E Inspiration Begins

http://vanessajunkin.files.wordpress.com/2013/06/waveform.jpg

Capnography

Sudden loss of waveform

- ET tube disconnected, dislodged, kinked or obstructed
- Loss of circulatory function

Decreasing $EtCO_2$

- ET tube cuff leak
- ET tube in hypopharynx
- Partial obstruction

CPR Assessment

- Attempt to maintain minimum of 10mmHg

Sudden increase in $EtCO_2$

- Return of spontaneous circulation (ROSC)

Bronchospasm ("Shark-fin" appearance)

- Asthma
- COPD

Hypoventilation

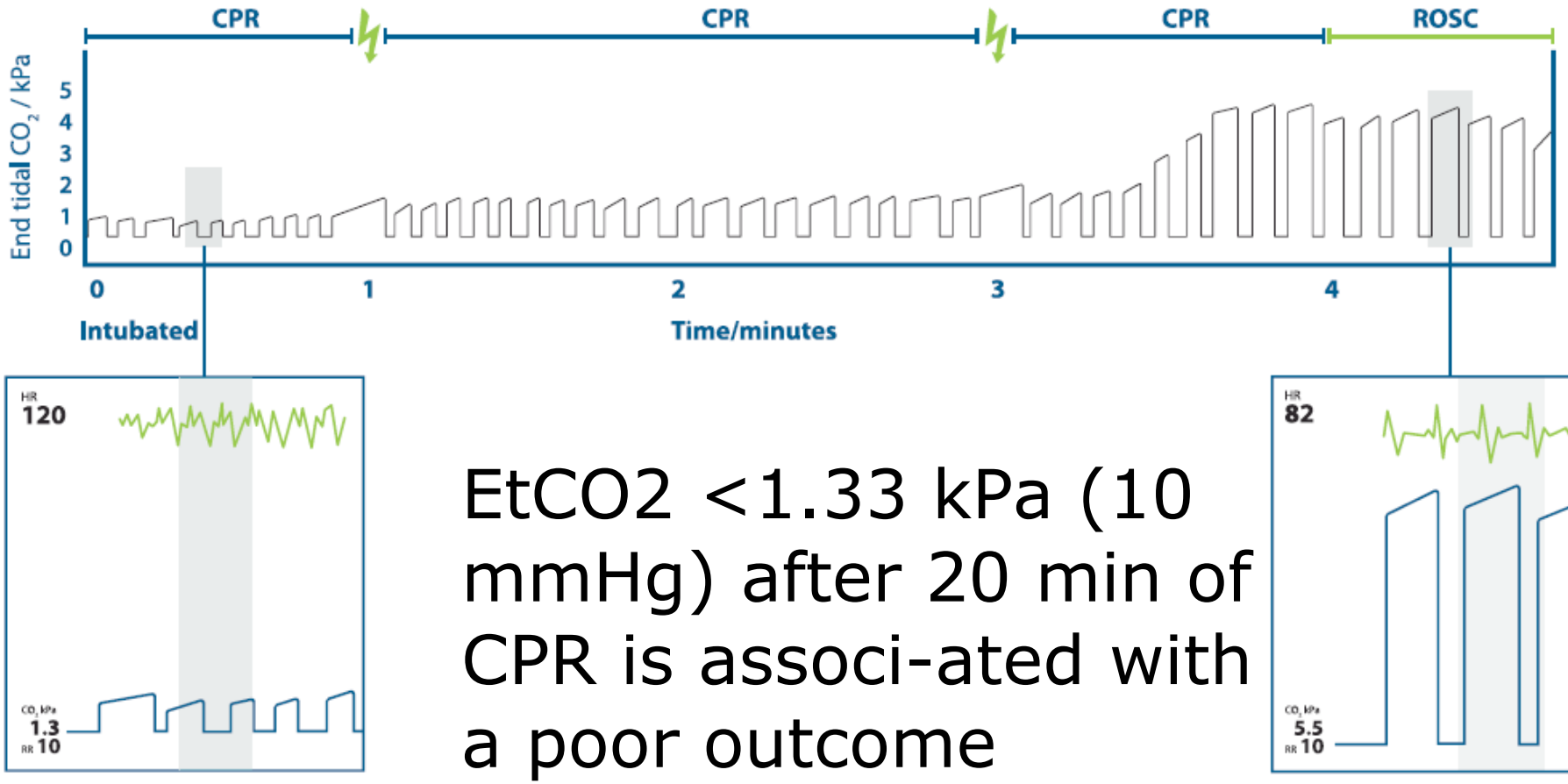
Hyperventilation

Decreased $EtCO_2$

- Apnea
- Sedation

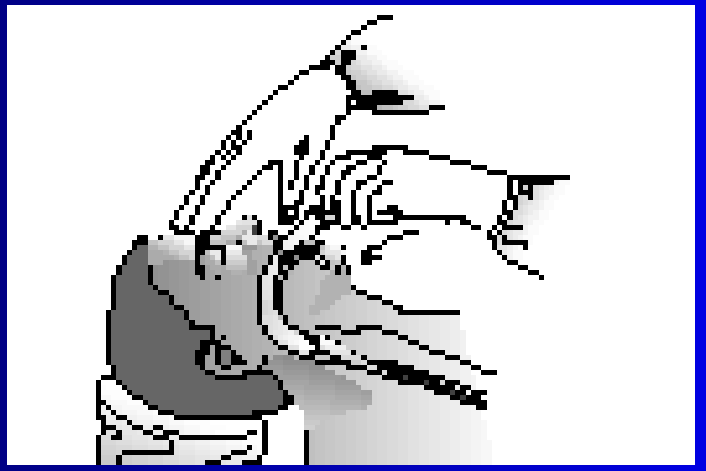
http://vanessajunkin.files.wordpress.com/2013/06/waveform.jpg

Capnography



EtCO2 <1.33 kPa (10 mmHg) after 20 min of CPR is associ-ated with a poor outcome

LM

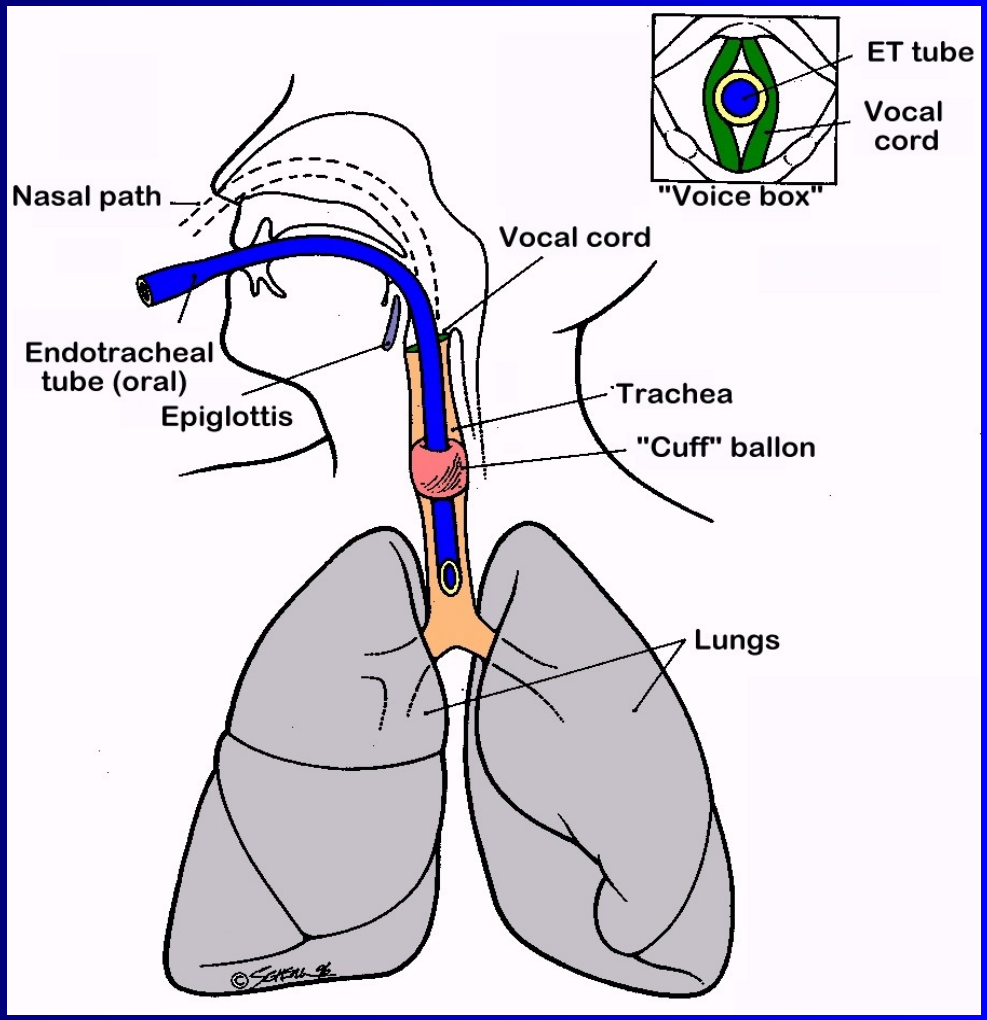


Intubation

- Laryngoskope
- Magill pincers
- tracheal tubes
- Introducer
- syringe

rarely:

- bronchoscope



Oxygen

- as high FiO2 as possible – during compressions
- Hypoxia and acidosis contra efficiency of electric and pharmacology therapy

Hyperoxemia after recovery of circulation is harmfull SpO2 .. 94%

Ratio 2005..2015

	compressions : breaths
• adult nonintubated	30 : 2
• adult intubated	100:10
• child	30:2
- 2medical = team	15:2
• newborn	3:1

Drugs - administration

Intravenously – periferal cath. - v. jugul. externa
- v. femoralis
- central v. cath. - v. subclavia
- v. jugul. interna

Intraoseal access - children

- Add 20ml i.v of fluids to move the drug.
- Effect in 1 min

drugs of VF

- **after 3rd defibrilation:**
- **Adrenalin 1 mg i.v. á 3 min.**

  children 10 μg/kg

- **Antiarhythmics:**

Amiodaron 5 mg/kg

300 mg i.v.

Epinephrine = Adrenalin

Alfa effect = **raise diastolic pressure**

- raise brain, heart perfusion pressure

Beta effect - raise contractility

- change of type of fibrillation

D: **1 mg i.v. a 3 min**

Fluids

- Bolus of 20ml after each dose = movement of drug
- Acute bleeding – rubt. AAA, EUG;

Types:

- Crystaloids – Ringer, Hartman, physiol. sol.
- Coloids – Gelatina, HAES = stark
- Glc – do NOT use – wrong neurology result

Monitoring during ACLS

- Clinical signs:
  breathing efforts, movements and eye open-ing
- ECG:
  Pulse checks when there is an ECG rhythm compatible with an output can be used to identify ROSC, but may not detect pulses in those with low cardiac output states and a low blood pressure
- Capnometry
-

When stop CPR:

- restored vital functions
- asystole for “20” minutes
- new information – when not to start

After recovery of circulation

The moment of greatest vulnerability is the instant immediately after victory.

Napoleon Bonaparte

After recovery of circulation

- ABCDE + Stabilisation of vital functions
- Diagnosis and treatment of the reason of arrest
- Hypo? Normo thermia 32 – 36°C for 12 – 24 h
  (better neurological outcome)
- Potasium
- Intubation, Mandatory Ventilation, NasoGastric tube
- sedation, Convulsion therapy