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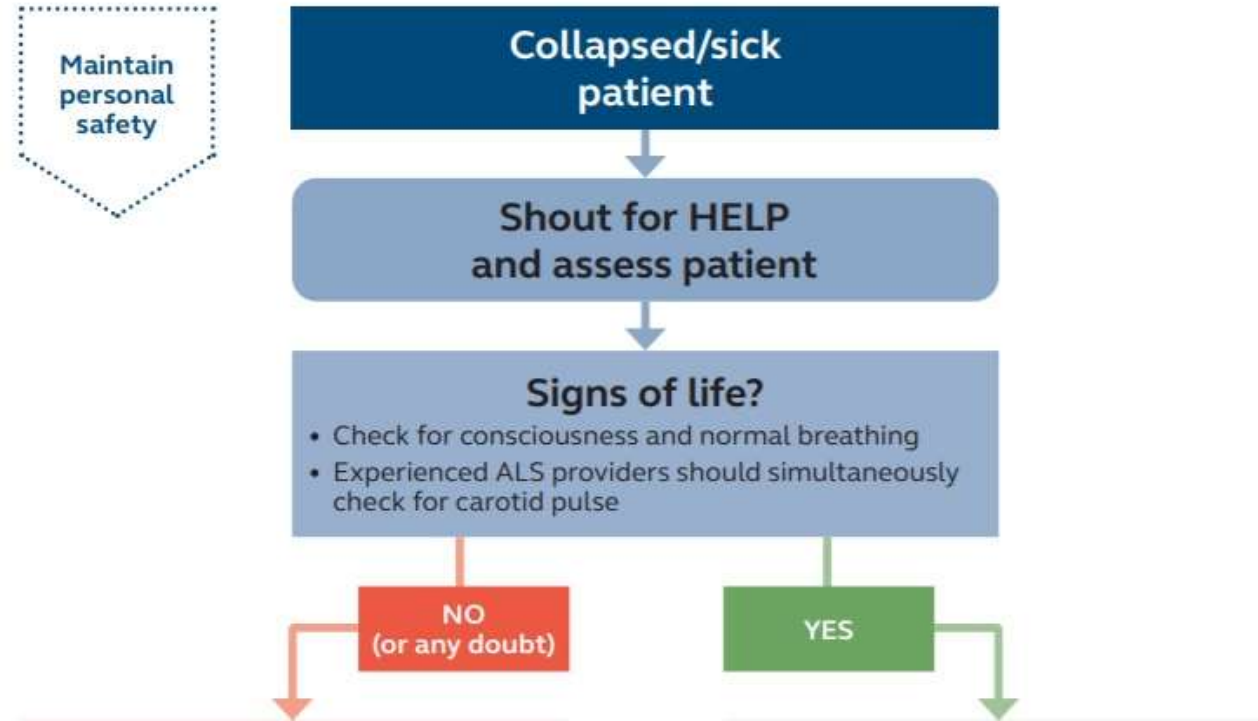
ALS - Shockable Rhythms - pharmacotherapy, defibrillation

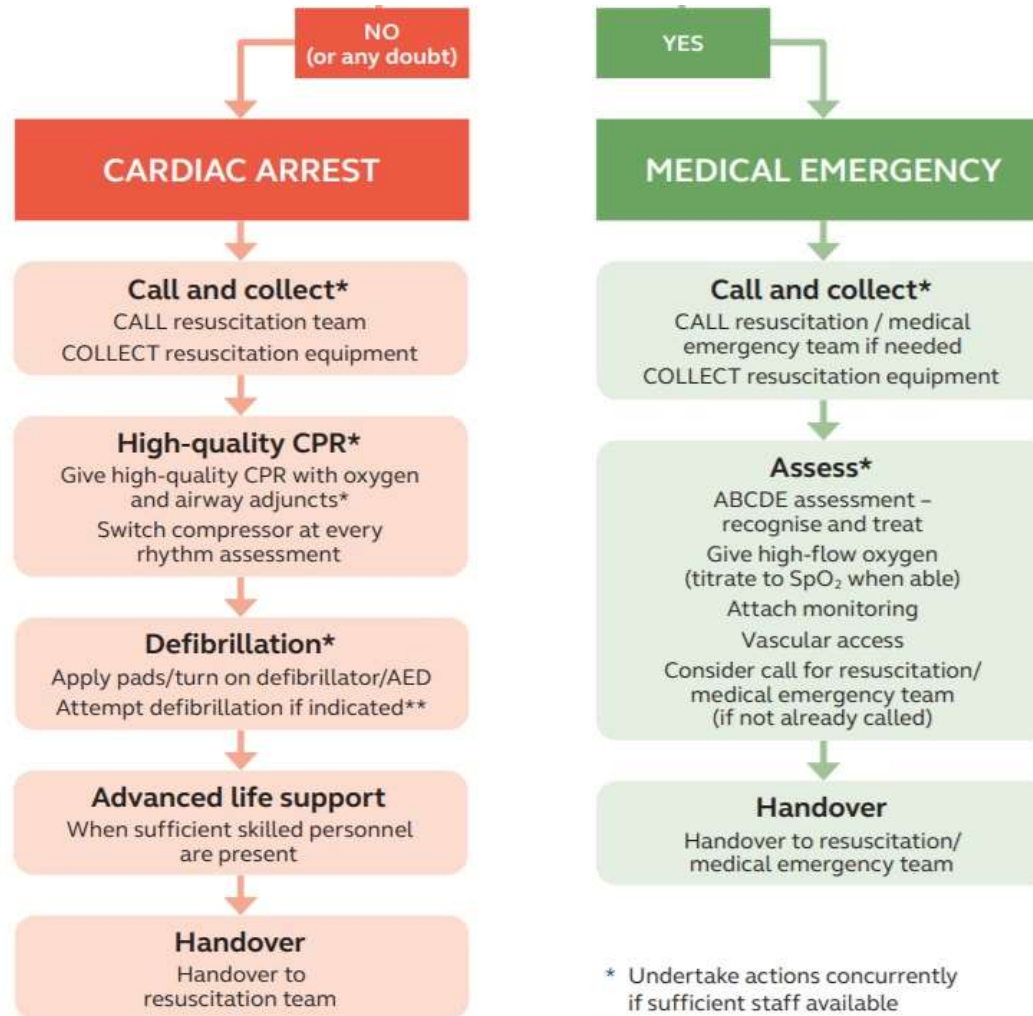
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Learning points

- The student will learn the correct procedure of Adult Cardiac Arrest Algorithm (or **A**dvanced **L**ife **S**upport)
- The student will learn to recognize the types of shockable rhythms and its treatment

Adult in-hospital resuscitation





* Undertake actions concurrently if sufficient staff available

** Use a manual defibrillator if trained and device available

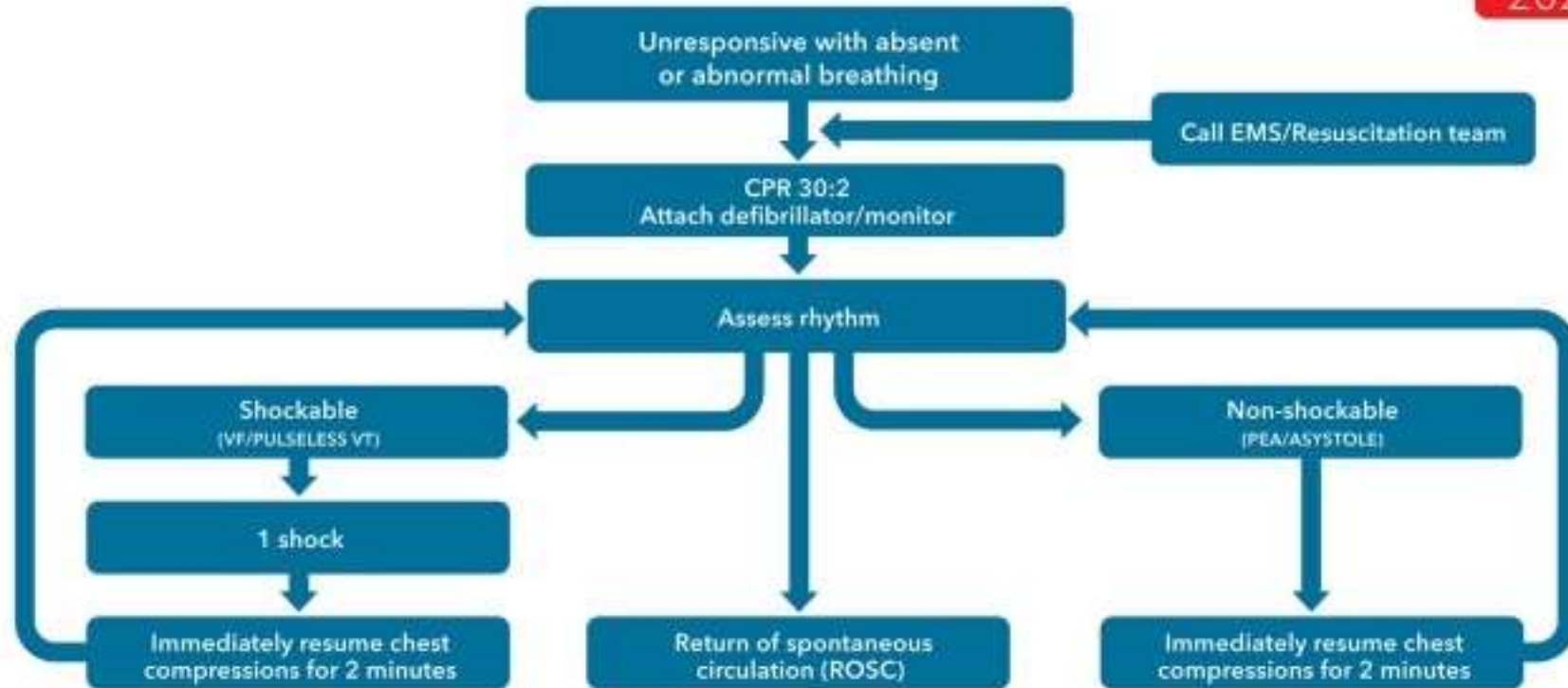
<https://www.resus.org.uk/library/2021-resuscitation-guidelines/adult-advanced-life-support-guidelines>

ERC Guidelines 2021

Treatment of in-hospital cardiac arrest

- hospital systems should aim to recognise cardiac arrest, start CPR immediately, and defibrillate rapidly (<3 min) when appropriate
- all hospital staff should be able to rapidly recognise cardiac arrest, call for help, start CPR and defibrillate (attach an AED and follow the AED prompts, or use a manual defibrillator)

ADVANCED LIFE SUPPORT

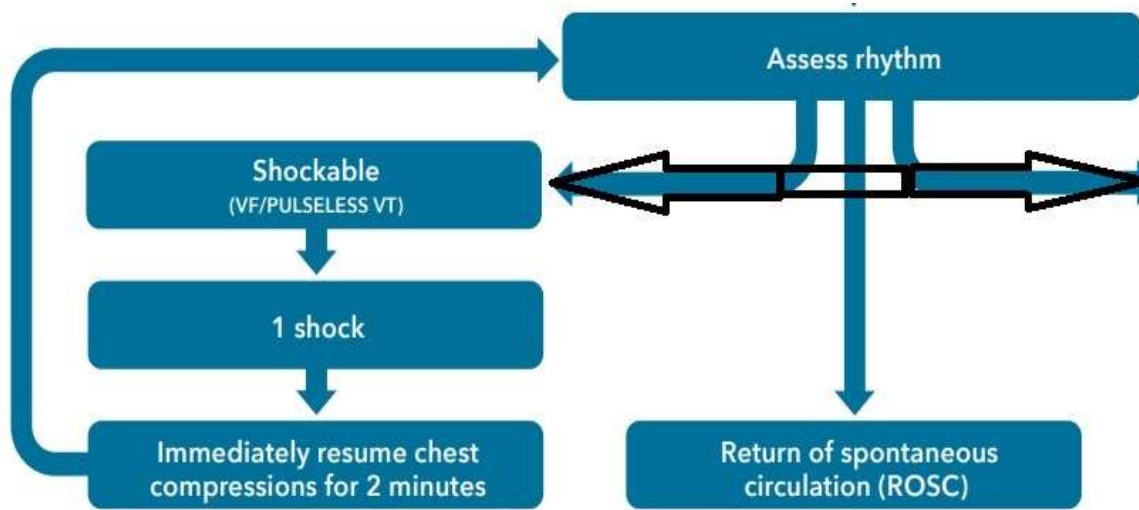


G.D. Perkins, et al., *European Resuscitation Council Guidelines 2021: Executive summary*, *Resuscitation* (2021), <https://doi.org/10.1016/j.resuscitation.2021.02.003>

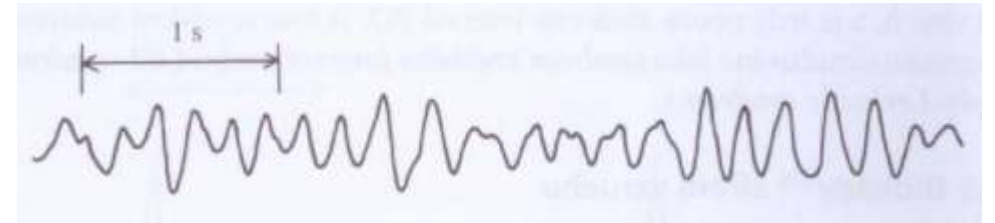
How to properly evaluate the heart rhythm?

- AED will do it 😊
- apply self-adhesive pads (or paddles could be used), the compressions of the chest are interrupted - evaluate the ECG on the monitor screen + palpate the pulse on the large arteries
 - shockable - VFib or pulseless V-Tach
 - non-shockable - aystole or PEA = pulseless electrical activity
- monitored (intubated) patient at ICU - unconsciousness, changes on ECG, unmeasurable invasive blood pressure and large decrease in ETCO₂ (capnography)

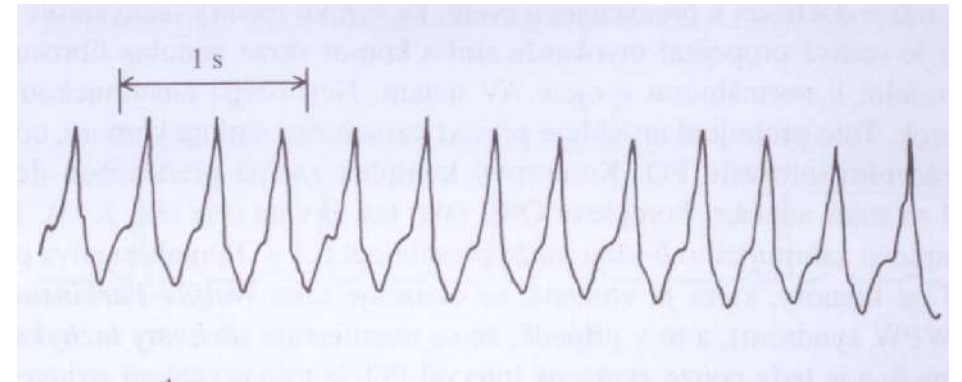
Shockable rhythms



Ventricular Fibrillation, or VFib



Pulseless ventricular tachycardia, or V-tach



How to deliver shock ?

- „know your defibrillator" - training and practice
- prefers the use of self-adhesive pads (antero-lateral), which can minimize interruption of compressions (up to 5 s)
- deliver the shock as soon as possible when you notice a shockable rhythm
- continuing chest compressions during defibrillator charging, delivering defibrillation with an interruption in chest compressions of less than 5 s and then immediately resuming chest compressions
- start with an energy of 150J for biphasic devices, (it is possible to increase the energy during CPR and refractory rhythm to max. values - usually 250J)

ALS with shockable rhythm ongoing ..

.. electric shock - compression with ventilation - after 2 min check the rhythm - and again ..

Give high-quality chest compressions and

- Give oxygen
- Use waveform capnography
- Continuous compressions if advanced airway
- Minimise interruptions to compressions
- Intravenous or intraosseous access
- Give adrenaline every 3-5 min
- Give amiodarone after 3 shocks
- Identify and treat reversible causes

Identify and treat reversible causes

- Hypoxia
- Hypovolaemia
- Hypo-/hyperkalemia/metabolic
- Hypo-/hyperthermia
- Thrombosis - coronary or pulmonary
- Tension pneumothorax
- Tamponade- cardiac
- Toxins

Consider ultrasound imaging to identify reversible causes

Consider

- Coronary angiography/percutaneous coronary intervention
- Mechanical chest compressions to facilitate transfer/treatment
- Extracorporeal CPR

After ROSC

- Use an ABCDE approach
- Aim for SpO₂ of 94-98% and normal PaCO₂
- 12 Lead ECG
- Identify and treat cause
- Targeted temperature management

.. after 3rd el. shock - apply medications

- Epinephrine = adrenaline
 - 1 mg IV / IO flushed with 20 ml crystalloid
 - continue every 3 - 5 minutes during ALS
- Amiodarone - antiarrhythmic drug
 - 300 mg IV / IO diluted in 20 ml glucose 5%
 - after 5th shock more 150 mg IV / IO could be applied
- Lidocaine = lignocaine - antiarrhythmic drug
 - 100 mg IV / IO flushed with 20 ml crystalloid
 - after 5th shock more 50 mg IV / IO could be applied



Special circumstances

- the use of up to three shocks in a row (within 1 min) can only be considered if the initial V Fib / pulseless V-Tach is spotted on the monitor, and with an immediately available defibrillator
 - during cardiac catheterization
 - hospitalised patient at ICU with monitored vital functions
 - during surgery

Thinking about the cause of the cardiac arrest ..

– H's:

- hypoxia
- hypovolemia
- hypothermia
- hyper- / hypokalemia, hypomagnesemia

– T's:

- thrombosis - acute MI
- toxins and drugs

– Electric shock, chest trauma ..

– Iatrogenic cause

- CVC cannulation (Seldinger technique), chest drain insertion (left-sided) ..

How can I help myself ?

Consider

- Coronary angiography/percutaneous coronary intervention
- Mechanical chest compressions to facilitate transfer/treatment
- Extracorporeal CPR

Consider ultrasound imaging to identify reversible causes

Termination of ongoing CPR / ALS

- successful CPR with ROSC (eg after defibrillation)
 - treatment of possible AMI via acute PCI
 - then placing the patient on the ICU for post-resuscitation therapy

- after 20 (30) minutes of asystole (but without potentially reversible cause)
 - there should be a local = intra-hospital guidelines

Take home message

G.D. Perkins, et al., *European Resuscitation Council Guidelines 2021:*

Executive summary, Resuscitation (2021),

<https://doi.org/10.1016/j.resuscitation.2021.02.003>



Fig. 7 - ALS infographic summary.

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References:

- lf3.cuni.cz/3LFEN-233.html
- <https://cprguidelines.eu/>
- <https://www.resus.org.uk/library/2021-resuscitation-guidelines/adult-advanced-life-support-guidelines>
- <https://www.proacsls.com/wiki/acls-algorithms/shockable-rhythms/>