CARDIAC ARREST

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Leicester Wilderness and Emergency Medicine Society

TODAY'S SESSION

01
Theory
Run through of the approach you would take with a patient in cardiac arrest

02
Practical
Practicing following resuscitation guidelines, and using the equipment

03
De-Brief
Discussion of how you found the session, learning points and things to take away from today's session

INTENDED LEARNING OUTCOMES

- **Identify a patient that is in cardiac arrest, or at risk of imminent cardiac arrest,** using the A-E assessment approach
- **Perform CPR/life support** to begin resuscitation of a patient while waiting for help to arrive
- **Identify when to call for assistance**
- Activate the adult/paediatric cardiac arrest team via a **2222 call**
- **Describe the role of the cardiac arrest team**, who is included within the team and how their roles are divided
- Understand the different methods of **airway management** in cardiac arrest, including **how to insert common airway adjuncts**
- **Understand principles of defibrillation** using both automatic and manual modes
- **Safely operate a defibrillator** in automatic mode
- **Identify when to stop resuscitation**, either due to return of spontaneous circulation (ROSC) or a failed resuscitation attempt
- **Appreciate the impact a resuscitation attempt can have on staff members**, and the need for a team debrief following a resuscitation attempt
- **Work as a team** to identify cardiac arrest, call for help and provide resuscitation to a patient in a **simulated** environment

01.

THEORY

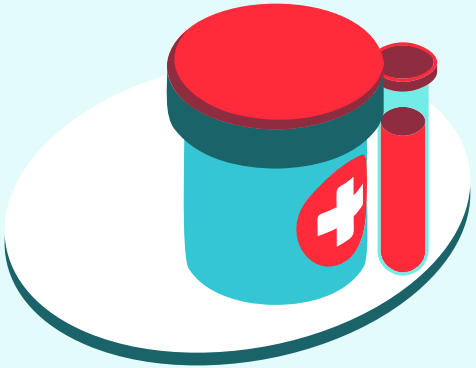
RECOGNISING CARDIAC ARREST

Identify patients at risk of cardiac arrest

- Being aware of which patients on your ward who are at risk of arrest
    - eg: previous MI, on certain medications, seizures
- You may be called to assess an unwell patient by nurses

Recognising a patient in cardiac arrest

- Sudden loss of responsiveness
- Abnormal, absent or slow, laboured breathing
- Lack of pulse
- Short period of seizure-like movements can occur at the start of cardiac arrest
- A-E approach in a seriously unwell patient



WHAT NEXT?

Call for help

Don’t delay in calling for help and/or pulling emergency alarm

Begin CPR

Start good quality chest compression

Send out 2222 call

Delegate this to the person who arrives when you call for help

Find crash trolley + AED

Ask the person making the 2222 call to bring this back with them

THE CRASH TROLLEY

Cardiac + Anaphylaxis Drugs

Adrenaline (1:1000 and 1:10,000)
Amiodarone
Adenosine
Atropine

Airway Management

Nasopharyngeal airways
Oropharyngeal airways
iGels
Endotracheal tubes + Macintosh blades
Suction equipment

Breathing Aids

Oxygen masks (varying types)
Pulse oximeter
Stethoscope

Circulatory Support

Defibrillator (on top of trolley)
Cannulation equipment
Blood tubes

IV Fluids

THE CRASH TEAM

Crash Team Leader

This will often be the Med Reg on call, or a consultant Critical Care Doctor

2 Junior Doctors

1 should be at least FY2/SHO level

Senior Nurse Support

Anaesthetist

Minimum level: core trainee

AIRWAY

AIRWAY MANAGEMENT

Identifying Airway Compromise...

...In the conscious patient:

- Swollen tongue (angioedema or anaphylaxis)
- Sooty sputum (thermal injury)
- Neck haematomas (blunt or penetrating trauma)
- Rashes (anaphylaxis/poisoning)
- Laboured breathing and wheeze (asthma)
- Facial fractures
- Crepitus and surgical emphysema (laryngeal injury)

... In the unconscious patient:

- Snoring or added airway noises (partial airway obstruction)
- Abnormal chest and abdominal wall movement (full airway obstruction)
- Lack of fogging of the oxygen mask

SIMPLE AIRWAY MANOEUVRES

Suction

- Can be used to clear vomit, blood, secretions and foreign bodies from airway
- If patient actively vomiting, turn them on their side and tilt head end of bed down
- No blind suctioning!
- Short, efficient burst of suctioning, focusing on areas where liquid may pool

Head Tilt Chin Lift

- Not an option in suspected C-spine injury
- Beware of overextension, as this can further compromise the airway
- If patient breathing adequately, high flow oxygen can be applied

Jaw Thrust

- lifts the mandible forwards and lifts the tongue off the posterior pharynx
- Used in patients requiring bag-valve mask ventilation
- Also used in patients with C-Spine injury

NASOPHARYNGEAL AIRWAYS

Indication

- Increased WOB/respiratory distress
- Aim is to address any airway obstruction and free up airway practitioner
- Helpful in patients whose mouth is difficult to open (eg: seizure)

Sizing & Insertion

- Come in 2 sizes
  - 6mm for women
  - 7mm for men
- Lubricate the tube with gel
- Insert into the nostril gently curved side down
- Aim towards the occiput
- Use a twisting motion if necessary

Notes

- Contraindicated in suspected basal skull #
- Can cause trauma to nasopharynx

OROOPHARYNGEAL AIRWAYS

Indication

- Increased WOB/respiratory distress
- Aim is to address any airway obstruction and free up airway practitioner
- Helpful in patients whose mouth is difficult to open (eg: seizure)

Sizing

- Sized from incisors to angle of mandible
- 3 sizes available

Insertion

- Insert OPA ‘upside down’
- Twist 180 once inserted halfway (behind the tongue)
- The flanged front end should sit just in front of the teeth

Notes

- May cause vomiting or laryngospasm
- Tolerating an OPA is an indicator of an unprotected vulnerable airway

SUPRAGLOTTIC AIRWAYS

Indication

- Best option (except ETT) for the patient in arrest
- Provides some aspiration protection but does NOT fully secure the airway

Sizing

- 3 sizes typically available
- Green = large adult
- Orange = medium adult
- Yellow = small adult

Insertion

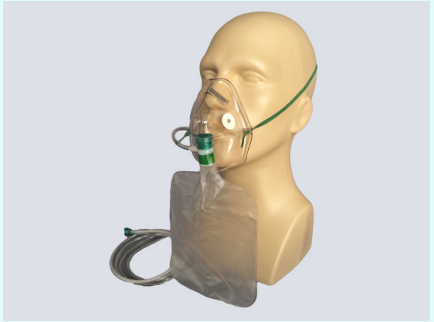
- Lubricate outer cuff
- Stand behind patient, hold i-Gel like a pen and insert into airway
- Push back over tongue, then backwards and downwards until it reaches back of hypopharynx
- Inflate the cuff using air-filled syringe
- Secure with bandage or tape
- Can attach to bag-valve mask, or ventilator

Notes

- Patient will not tolerate unless completely unconscious

BREATHING

VENTILATION – Choice of Mask



- After securing an unconscious patient's airway, you must decide whether they require
  - Passive ventilation
    - Non-rebreather mask
  - Active ventilation
    - Bag-valve mask

- Assess the adequacy of spontaneous ventilation by looking at:
  - the depth of chest wall movement
  - the rate of chest wall movement
  - the coordination of breaths
  - the oxygen saturations
  - the end tidal c02 or pCO_2 by arterial blood gas analysis

VENTILATION – Method

1. Apply the mask firmly to the patients face using the index finger and thumb in a capital C shape
2. Hook the little finger under the angle of the mandible and grip more mandible with the ring and middle fingers
3. Raise the spread fingers to effect the jaw thrust
4. Squeeze the bag firmly with the right hand, release, pause and repeat at a rate of 10 breaths per minute (continuous ventilation) or at a compression:ventilation ratio of 30:2

Issues Ventilating?

- Call for senior help!
- In the interim…
  - Try 2 NPA and an OPA
  - Try an LMA/SGA
  - May require intubation

VENTILATION – Troubleshooting

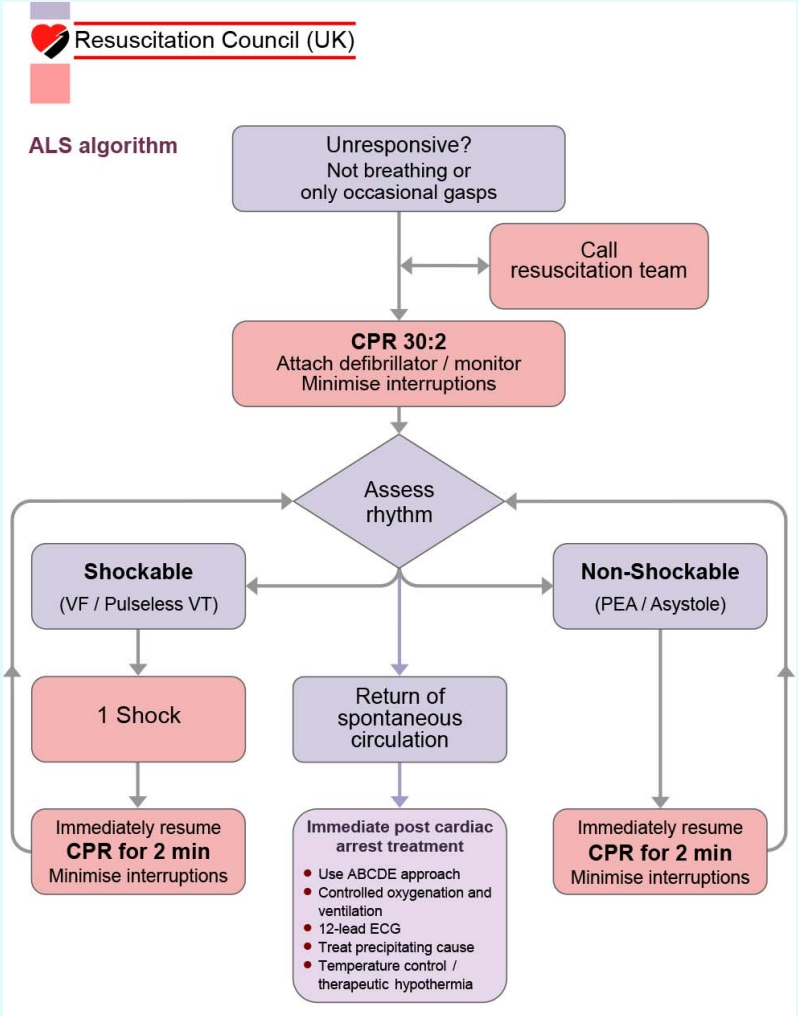
Poor mask seal	**Solution**
Blood and vomit creating a slippery surface	Clear the airway with suction; use a towel to dry the patient's face
Edentulous patient	Replace the dentures or pack the cheeks with gauze if dentures missing
Unstable facial fractures	• Use a two-person technique • Consider early intubation
Beard	Apply gel to improve the seal
Facial asymmetry	Use a two-person technique??
Difficult ventilation	**Solution**
History of snoring	Attention to correct head/neck positioning +/-adjuncts +/- two-person technique
Abdominal distension including obesity, third trimester and ascites	Consider elevating the head end in non-traumatic patients
Stiff or immobilised neck	No options available. Do not force elderly patients necks
COPD/asthma	Aggressive medical therapy
??Big tongue	Consider oropharyngeal airway

CIRCULATION

ALS ALGORITHM

During CPR

- Ensure high-quality CPR: rate, depth, recoil
- Plan actions before interrupting CPR
- Give oxygen
- Consider advanced airway and capnography
- Continuous chest compressions when advanced airway in place
- Vascular access (intravenous, intraosseous)
- Give adrenaline every 3-5 min
- Correct reversible causes



DEFIBRILLATION

AUTOMATIC

- Door closed on defib
- Assesses rhythm for you and advises whether shock needed
- Charges to pre-set power
- All you have to do is press the shock button once charged

MANUAL

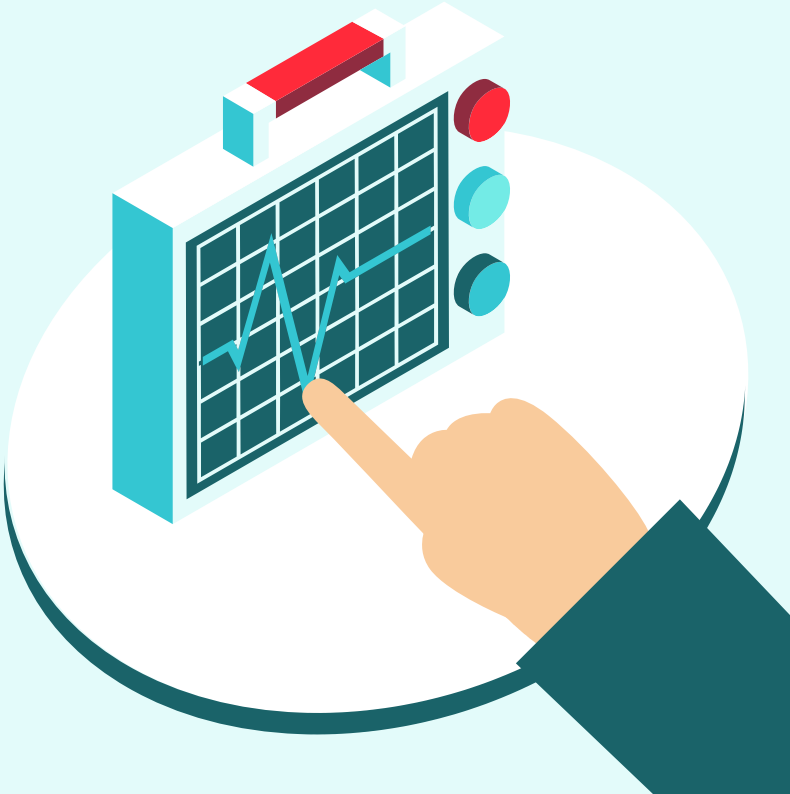
- Have to open door on defib to activate manual mode
- Shows rhythm for you to assess
- You are responsible for charging to right power, and delivering shock
- Can also pace in manual mode

SHOCKABLE VS. NON-SHOCKABLE RHYTHMS

- Not every rhythm in cardiac arrest is shockable!
- Important to distinguish the **shockable** rhythms **(VT/Pulseless VT)** from the **non-shockable** rhythms **(PEA/asystole)**

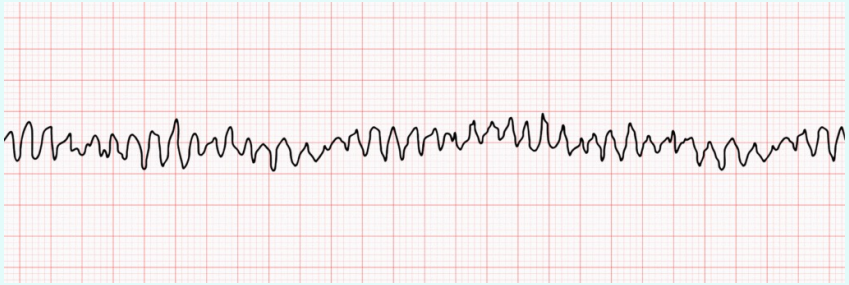
- **"Non-shockable"** means the heart's electrical pacemaking system has shut down completely, and the patient will not benefit from defibrillation.

- **"Shockable"** means the electrical system is still working, but is delivering signals to the heart's chambers irregularly. In this case, defibrillation may help.



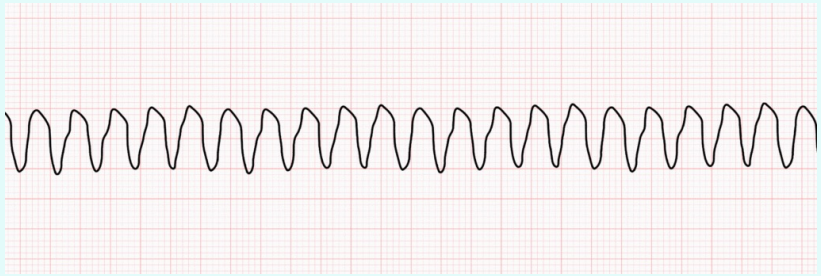
SHOCKABLE RHYTHMS

Ventricular Fibrillation (VF)



- An abnormal heart rhythm in which the ventricles twitch, rather than performing proper, effective beats
- Often comes on shortly after a heart attack (MI)
- The leading cause of sudden cardiac death

Pulseless Ventricular Tachycardia (VT)

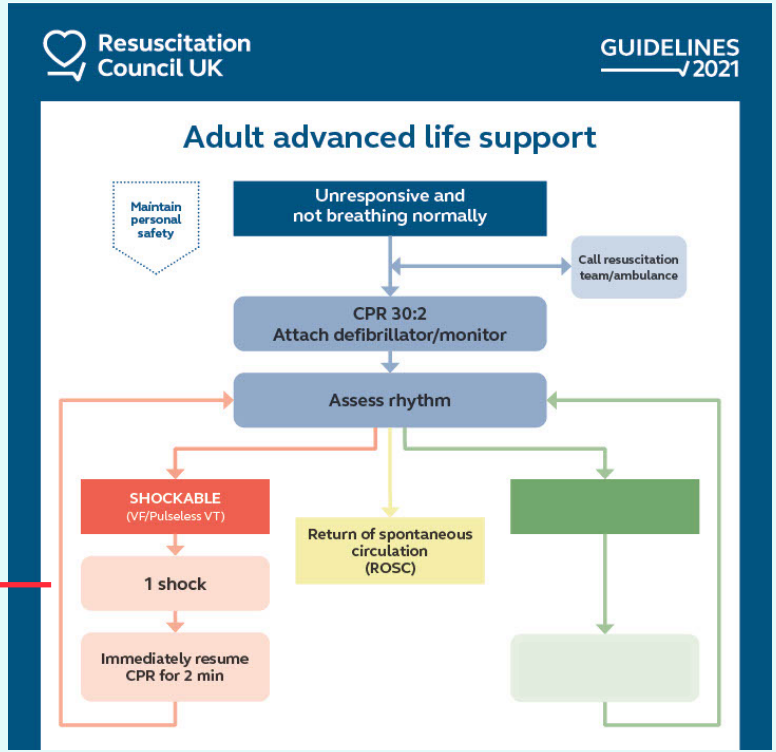


- Tachycardia (>100bpm) caused by irregular electrical impulses in the ventricles
- If in cardiac arrest and has no pulse in this rhythm, is pulseless VT and can deliver a shock via defibrillator

SHOCKABLE RHYTHMS

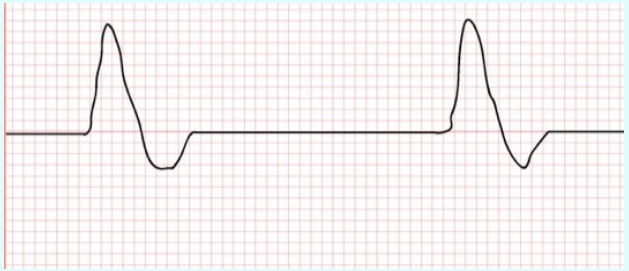
Management

- After the *third shock*, give **adrenaline 1 mg IV (10 ml of 1:10,000)** and **amiodarone 300 mg IV**
- Continue giving adrenaline after alternate shocks ie *fifth, seventh, ninth, eleventh* etc



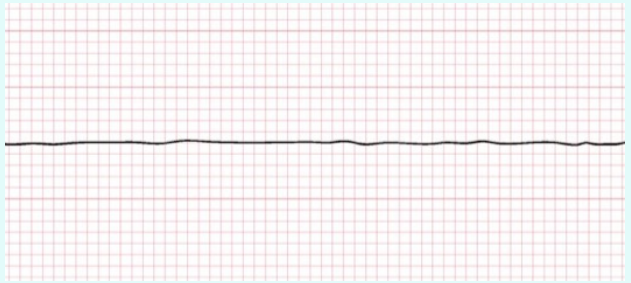
NON-SHOCKABLE RHYTHMS

Pulseless Electrical Activity (PEA)



- The heart's electrical activity is too weak to continue pumping blood throughout the body
- The electrical activity is working fine, it's just that it's not powerful enough, therefore a shock will not help in this instance

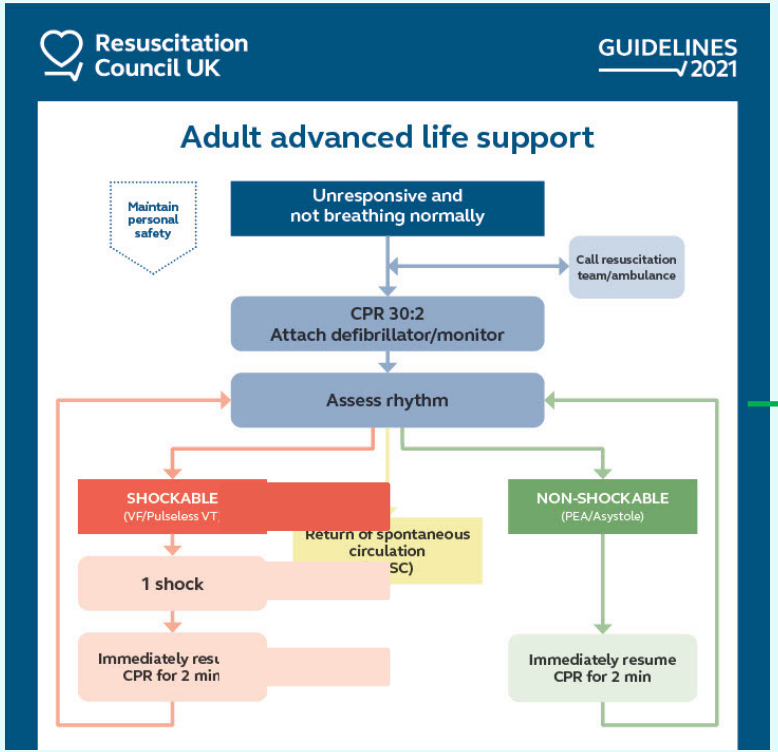
Asystole



- The heart's electrical system has shut down and there is no heartbeat
- Can be the result of untreated VT or VF
- Shocking will not help, as there is no electrical activity to rectify

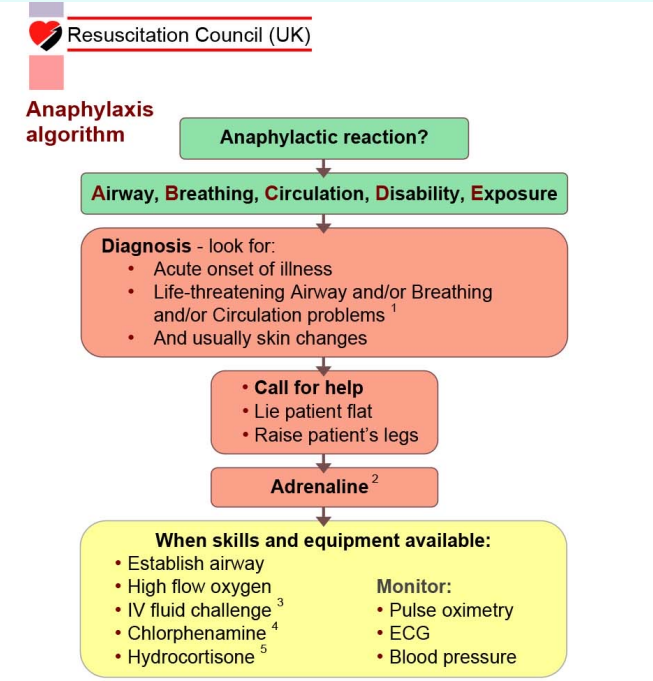
NON-SHOCKABLE RHYTHMS

Management



- After the *first rhythm check*, give adrenaline 1 mg IV (10 ml of 1:10,000)
- After the *third rhythm check*, given adrenaline 1 mg IV (10 ml of 1:10,000); continue giving adrenaline after alternate rhythm checks ie fifth, seventh, ninth, eleventh etc

RESUSCITATION IN ANAPHYLAXIS



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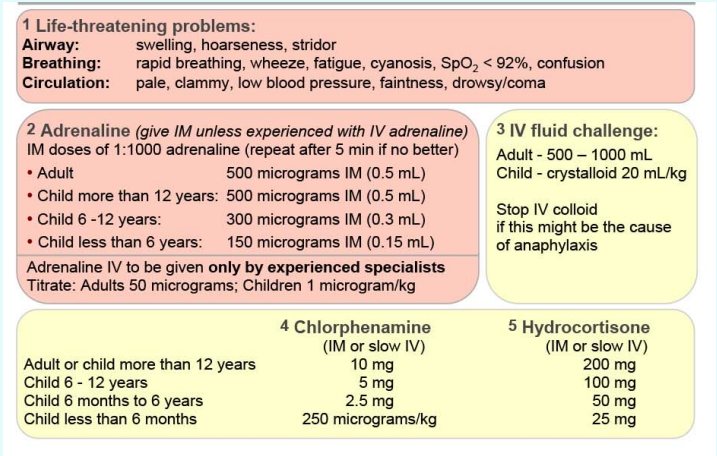


REVERSIBLE CAUSES OF CARDIAC ARREST

REVERSIBLE CAUSES OF CARDIAC ARREST

4 H's

Cause	Intervention
Hypoxia	Ensure patent airway and adequate O2 delivery
Hypovolaemia	Fluid resuscitation +/- blood products
Hypo/hyperkalaemia (and other electrolyte derangements)	Correct according to guidelines
Hypothermia	Rewarm to 32-34 degrees celsius slowly

4 T's

Cause	Intervention
Tension pneumothorax	Needle decompression
Tamponade	Bedside echo and pericardiocentesis
Toxins	Check hx and drug chart. Refer to Toxbase if needed.
Thrombosis	Bedside USS and thrombolysis

STOPPING RESUSCITATION

RRETURN OF SPONTANEOUS CIRCULATION

1) Re-check A-E

- Is the most appropriate airway in? Do they need to be intubated?
- Are they making efforts to breathe for themselves? If not, continue ventilation
- Re-do bloods and ABG, CXR if not done already, may need central line

2) Identify and treat any underlying pathology

3) Notify and handover to ITU

- Clinical neurological findings (eg: retention of any neurological function?)
- Comorbidities and age
- Type of arrest and rhythms seen
- Downtime, delay to start of CPR, quality of CPR
- Interpretations of any key investigations already done and those ordered

NO ROSC?

When do we decide to stop?

- Most resuscitation attempts are unsuccessful – it is important to know when to stop
- The decision to stop CPR should be tailored according to the specifics of the individual patient and is based on clinical judgement
- Decision typically made by Team Leader, in consultation with the rest of the team

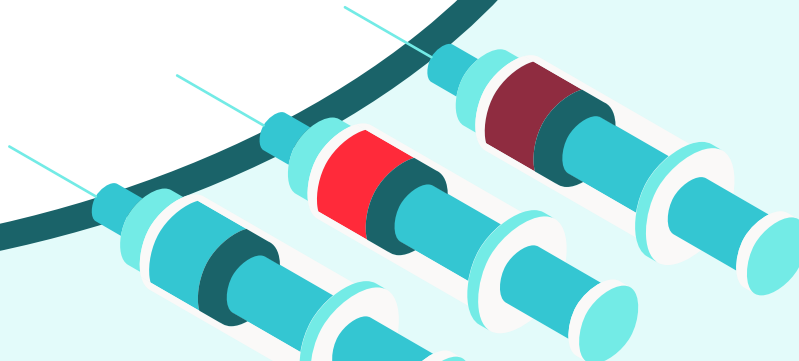
Key Questions/Considerations

- Was arrest observed?
- What was the initial rhythm? Did the rhythm change?
- Cardiac vs. non-cardiac cause? Any reversible causes identified?
- Time to CPR?
- Time to defibrillation? Number of shocks? Which medications given?
- Time to ROSC?
- Intubated? CO2 concentrations?
- Neurological deficits identified?
- Circumstances surrounding arrest (including co-morbidities)

02.

PRACTICAL

- Separate into your 5 groups
- Practice with the equipment available on each station
- Committee members will be available to help if you have any questions or need help with any practical elements
- 8 minutes per station – make sure everyone gets a fair turn!

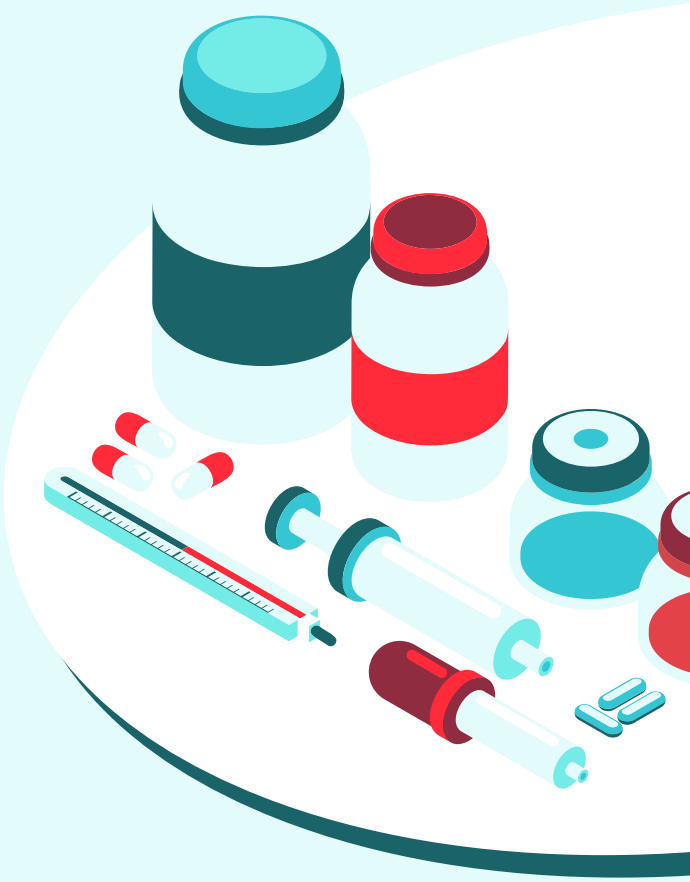


03.

DE-BRIEF/ FEEDBACK

DE-BRIEF

- Anything you're confused/worried about after the practical?
- Any worries about attending a cardiac arrest as a student in the hospital setting?
- Any comments on how it felt practicing with the equipment?



FEEDBACK

Please fill out the feedback form before you leave!

Slides will be distributed out to you ASAP

RESOURCES

- www.resus.org.uk
- www.rcemlearning.co.uk
- www.litfl.com
- www.oxfordmedicaleducation.com

- https://secure.library.leicestershospitals.nhs.uk/PAGL/Shared%20Documents/Cardiopulmonary%20Resuscitation%20Policy%20UHL%20LLR%20Alliance%20LPT.pdf