Advanced Life Support

Start by assessing the patient as below (basic life support until defibrillator trolley arrives):

Mnemonic: DRAB

- **Danger**: check around patient and environment for danger
- **Response**: question (e.g. hello, can you hear me?), shake and command (e.g. open your eyes)
  - If unresponsive, shout “Can I get some help over here please?” and make the bed flat and move it forwards so someone can get behind the head of the bed.
- **Airway**: ensure bed is flat, open airway with head-tilt chin-lift (if no risk of spine injury) or jaw thrust (if risk of spine injury) and look for obstructions
- **Breathing**: assess breathing for up to 10 seconds by listening and feeling with your ear, watching for chest movements; you should also palpate the carotid pulse simultaneously.
  - You should do this while maintaining the head-tilt chin-lift or jaw thrust (e.g. place your forearm on the patient’s forehead, apply positive pressure to tilt the head back, and reach around their face to pull up the angle of the jaw with the index and middle fingers, whilst palpating the carotid pulse with the other hand.)
  - If no breathing, ask a helper to call 2222 and explain there is an adult/paediatric/neonatal/trauma cardiac arrest and the location.
  - Ask the helper to bring the resuscitation trolley back with them.
  - (If there are no helpers, you must leave the scene now and call 2222 yourself)

Now start performing CPR compressions immediately. When help arrives, as first on the scene, you are in charge of co-ordinating the resuscitation and have to delegate all tasks (a more experienced doctor may take over). You should be hands-off where possible. Start this by getting somebody to take over chest compressions as soon as the first person arrives.

Tasks needing to be performed simultaneously (and, hence, delegated) are shown below in order of priority...

### Continuous Chest Compressions

- Perform at a rate of **100-120/min** (i.e. 2/second) and a depth of **5-6cm**. You must fully extend your elbows, wrists and fingers. Have both hands palm downwards and interlock fingers. Place the carpals area of the lower hand over the mid-sternum and apply all the compression pressure over this point.
- ONLY stop CPR for 5 second rhythm checks, electrical shocks and the 2 rescue breaths (before the airway is secure). Ask the person doing compressions to tell the airway person each time 30 compressions are complete.
- Chest compressions should be continuous once the airway is secured (supraglottic airway/endotracheal tube)
- Switch CPR provider during the rhythm check every 2 minutes (or earlier if they tire)

### Defibrillation

#### Setup

- Working around person performing compressions, place the 2 defibrillation pads in the correct position on the chest (one below right clavicle, other over cardiac apex). You may need to shave/dry the chest (leave jewellery on, but move it out the way).
- NB. if a pacemaker is present, ensure pads are >8cm away from it (you can put the pads on A-P if needed).
- Connect pads to defibrillator and set monitoring trace to 'pads' (see image at bottom of document)

#### Use

- When pads are in place and defibrillator is on, immediately ask for CPR to be stopped for a 5 second rhythm check – determine if the rhythm is **shockable** (‘wavy lines’ – VF, VT) or **non-shockable** (asystole, PEA)
  - If an organised rhythm seen, also feel for a central pulse (stop compressions if pulse felt)
- Then immediately continue CPR
- If shockable, follow these extra steps
  - Select correct energy level for device (**usually 150J biphasic** – if unsure, don’t delay and give the highest energy level shock)
  - Ask for the oxygen and everybody except the person doing compressions to move away (tell the compression person to continue and you will tell them when to move away before the shock)
  - Charge defibrillator – press charge (button 2) and then move hand away from machine
  - Once charged, ask the compressions to now be stopped and shout “everybody stand clear”
  - Check the area is clear (i.e. check no one is in contact with the patient/bed and that the oxygen is away)
  - Deliver shock – press shock (button 3)
  - Immediately re-start CPR
  - Note: while operating defibrillator, always look outwards around the bed (not at the machine) and never float your hand near the buttons
- Delegate someone to manage timing and say when 2 minute cycles are up and remember the cycle number (use defibrillator timer which starts when defibrillator is turned on) – **repeat the rhythm check ± shock every 2 minutes**

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Airway Management

- **Airway options** (see airways notes)
  - Face mask with bag (30 compressions to 2 breaths): 1 person holds the rigid part of the mask while pulling the jaw up into the mask, while another person squeezes the bag.
  - Consider also placing an oropharyngeal (Guedel)/nasopharyngeal airway under the mask if struggling.
  - Supraglottic airway (laryngeal mask/LMA, i-gel): once placed, give breath every 6 seconds and do continuous compressions.
  - Intubation with endotracheal tube: likewise. This is gold-standard.
- Attach 15L/min oxygen
- Avoid hyperventilation

Drugs

- Obtain IV access and have drugs ready
  - If you cannot get IV access after 2 attempts, get interosseous access via head of humerus or tibial tuberosity
  - Take blood from the cannula including FBC, U&Es, Mg²⁺, G&S, VBG
- **Adrenaline 1mg IV** (10ml of 1 in 10,000):
  - Shockable rhythm: give after 3rd shock (during CPR). Flush with 20ml saline.
  - Non-shockable rhythm: give as soon as IV access is established. Flush with 20ml saline.
- **Amiodarone 300mg IV**: if shockable rhythm only. Only given after 3 shocks have been administered (during CPR)

Assess Reversible Causes

Done by team leader.
By assessing the patient, speaking to nurses/relatives and reviewing their drug cardex and notes, eliminate/treat each one of the following reversible causes (4 H's, 4 T's):

<table>
<thead>
<tr>
<th>Reversible cause</th>
<th>Assessing it</th>
<th>Treating it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoxia</td>
<td>Ventilation adequacy, oxygen flow rate,</td>
<td>15L/min oxygen and good ventilation</td>
</tr>
<tr>
<td></td>
<td>oxygen sats</td>
<td></td>
</tr>
<tr>
<td>Hypovolaemia</td>
<td>History, drains, haemorrhage, fluid</td>
<td>Fluid resuscitation</td>
</tr>
<tr>
<td></td>
<td>collections (expose patient)</td>
<td></td>
</tr>
<tr>
<td>Hypo/hyperkalaemia</td>
<td>Bloods/ABG/ABG/latest results</td>
<td>Correct abnormality</td>
</tr>
<tr>
<td>Hypermithemia</td>
<td>Patient’s temperature on recent obs</td>
<td>Warm patient</td>
</tr>
<tr>
<td>Tension pneumothorax</td>
<td>Tracheal deviation, hyper-resonance,</td>
<td>Insert cannula into second intercostal</td>
</tr>
<tr>
<td></td>
<td>decreased breath sounds</td>
<td>space, mid-clavicular line</td>
</tr>
<tr>
<td>Tamponade, cardiac</td>
<td>Recent chest trauma/surgery</td>
<td>Pericardiocentesis</td>
</tr>
<tr>
<td>Toxins</td>
<td>History, drug chart, gather info, BM</td>
<td>Treat toxaemia</td>
</tr>
<tr>
<td>(nurse/relatives)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thrombosis (coronary or pulmonary)</td>
<td>History, legs (DVT signs), post surgery?</td>
<td>Thrombolysis if PE, call cardiology if MI</td>
</tr>
</tbody>
</table>

What Next?

Return of circulation

- Full ABCDE assessment
- Controlled oxygenation (aim 94-98%)
- Consider therapeutic hypothermia 32-34°C for 24 hours (avoid hyperthermia)
- Post-arrest investigations (CXR, 12 lead ECG, full set of bloods, echo, ABG, capillary glucose & cardiac monitoring)
- Treat cause
- Consider transfer to intensive care if still requiring ventilation or high-dependency care if not

No return of circulation

- In general, CPR should be continued as long as there is a shockable rhythm
- Only stop if a registrar or above makes the decision

Afterwards

- Retrospectively document everything that happened
Special Cases

Pregnancy

- Left lateral tilt if feasible or manual displacement or uterus to the left (prevents caval compression during CPR)
- Prepare for emergency C-section if >20 weeks gestation – should be performed within 5 minutes of cardiac arrest

Algorithm differences in children

- Pulse check
  - Infant (<1 year): feel brachial pulse
  - Children (>1 year): feel carotid pulse
- Compression:ventilation ratio
  - At birth: 3:1 ratio
  - Infants/children: start with 5 rescue breaths, then 15:2 ratio
- Compressions
  - Compress to at least one-third the A-P chest diameter
  - Infant (<1 year):
    - Lone rescuer: compress the sternum with the tips of two fingers
    - Two or more rescuers: encircling technique – performed by placing both thumbs flat on the lower sternum pointing towards the infant’s head and the fingers around the rib cage
  - Children: as in an adult but only use one hand
- Defibrillation
  - Energy:
    - Manual defibrillator: 4J/kg
    - Adult defibrillator for child <8 years: use paediatric-attenuated adult shock energy
    - Adult defibrillator for child >8 years: use adult shock energy
  - Children: 8-12cm pads
  - Infants: 4.5cm pads
  - If paediatric electrodes are unavailable, it is acceptable to use the adult defibrillator and settings – ensure the pads are not touching
- If you are on your own, perform CPR for 1 minute before leaving to get help (unless it was a witnessed, sudden collapse – more urgent defibrillation required)
- Drug doses
  - Adrenaline 10mcg/kg (0.1ml/kg of 1:10,000 solution)
  - Amiodarone 5mg/kg – repeat same dose after 5th shock if still in shockable rhythm

Drowning

- Give 5 initial ventilations first, then continue at normal 30:2 ratio
- If there is a delay getting the victim to land:
  - <5min: give 10-15 rescue breaths in the water over 1 minute then continue rescue breaths while towing
  - >5min: give 10-15 rescue breaths in the water over 1 minute then stop and get them to shore ASAP without further attempts
- Dry the patient’s chest prior to defibrillation

Asthma

- Intubate the trachea early
- In VF consider higher shock energies if initial attempts fail (hyperexpanded chest)