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| 2-1 Cardiac arrest v.1 |
| The probable cause is one or more of: something related to surgery or anaesthesia; the patient’s underlying medical condition; the reason for surgery; equipment failure.  The first priority is to start chest compressions, then get help, then find and treat the cause using the guideline. |

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| Box A: POTENTIAL CAUSES | |
| *4 H’s, 4 T’s:*  Hypoxia (→ 2-2)  Hypovolaemia  Hypo/hyperkalaemia  Hypothermia  Tamponade (→ 3-9)  Thrombosis (→3-5)  Toxins  Tension pneumothorax | **Specific peri-operative problems:**  Vagal tone  Drug error  Local anaesthetic toxicity **(→ 3-10)**  Acidosis  Anaphylaxis **(→ 3-1)**  Embolism, gas/fat/amniotic **(→ 3-5)**  Massive blood loss **(→ 3-2)** |

START.

❶ **IMMEDIATE ACTION**

* **Declare “cardiac arrest”** to the theatre team AND note time.
* Delegate one person (minimum) to chest compressions 100 min-1, depth 5 cm.
* Call for help: nearby theatres / emergency bell / senior on-call / dial emergency number.
* Call for cardiac arrest trolley.
* As soon as possible, delegate task of evaluating potential causes (Box A).

❷ **Adequate oxygen delivery**

* Increase fresh gas flow, give 100% oxygen AND check measured FiO2.
* Turn off anaesthetic (inhalational or intravenous).
* Check breathing system valves working and system connections intact.
* Rapidly confirm ventilator bellows moving or provide manual ventilation.

❸ **Airway**

* Check position of airway device and listen for noise (including larynx and stomach).
* Confirm airway device is patent (consider passing suction catheter).
* **If expired CO2 is absent, presume oesophageal intubation until absolutely excluded.**

❹ **Breathing**

* Check chest symmetry, rate, breath sounds, SpO2, measured expired volume, ETCO2.
* Evaluate the airway pressure using reservoir bag and APL valve.

❺ **Circulation**

* Check rate and adequacy of chest compressions (visual and ETCO2).
* Encourage rotation of personnel performing compressions.
* If i.v. access fails or impossible use intraosseous (IO) route.
* Check ECG rhythm for no more than 5 seconds.
* Follow Resuscitation Council (UK) and ERC Guidelines.
* See Boxes B and C for reminders about drugs and defibrillation.

❻ **Systematically evaluate potential underlying problems and act accordingly** (Box A).

❼ If there is return of spontaneous circulation, re-establish anaesthesia.

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| Box B: DRUGS FOR PERI-OPERATIVE CARDIAC ARREST |
| Fluid bolus 20 ml.kg-1 (adult 500 ml).  Adrenaline 10 µg.kg-1 (adult 1000 µg – may be given in increments).  Atropine 10 µg.kg-1 (adult 0.5-1 mg) if vagal tone likely cause.  Amiodarone 5 mg.kg-1 (adult 300 mg) after 3rd shock.  Magnesium 50 mg.kg-1 (adult 2 g) for polymorphic VT/hypomagnesaemia.  Calcium chloride 10% 0.2 ml.kg-1 (adult 10 ml) for magnesium overdose, hypocalcaemia or hyperkalaemia.  Thrombolysis for suspected massive pulmonary embolus. |

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| BOX C: DEFIBRILLATION |
| Continue compressions while charging: Biphasic 4 J.kg-1 (adult 150-200 J)  DO NOT check pulse after defibrillation.  Use 3 stacked shocks in cardiac catheterisation lab. |

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| BOX D: DON’T FORGET! |
| * Use waveform capnography. No expired CO2 = lungs not being ventilated (assume and exclude oesophageal intubation). Very rarely, absent/minimal expired CO2 = CPR not occurring OR pulmonary circulation disconnected from systemic (e.g. in major trauma). Sudden increase in ETCO2 usually signals return of spontaneous circulation. * Optimise position for chest compressions (use overhead for bariatric patients). * Uterine displacement in pregnant patients. * Ventilator can free up hands but remember to set to volume control. Minimise intrathoracic pressure: avoid excessive tidal volume and hyperventilation. |

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