Unexplained Intrapartum or Postpartum Maternal Collapse UHL Obstetric Guideline

University Hospitals of Leicester NHS Trust

Trust Ref C44/2011

Contents

1. Introduction and who the guideline applies to:

This document sets out the procedures and processes to follow in the event of an unexplained intra/postpartum collapse with the intention of providing safe and effective care to this patient group.

These guidelines are for the use of all staff involved in the management of unexplained intra/postpartum collapse. This includes midwifery, obstetric, anaesthetic, imaging, and blood transfusion staff.

Risk Management:

A clinical incident reporting form must be completed for all obstetric emergencies. Please refer to the Maternity Risk Management Strategy for details.

Related documents:

- Enhanced Maternity Care UHL Obstetric Guideline
- Declining Blood and Blood Products UHL Obstetric Guideline
- Maternity Records Documentation UHL Obstetric Policy
- Patient Health Records - Documenting UHL Policy
- Maternal Death UHL Obstetric Guideline
- Last Offices Care of the Deceased UHL Policy
- Pre Eclampsia and Eclampsia - Severe UHL Obstetric Guideline
- Surgical Swabs Instruments Needles and Accountable Items UHL Policy
- Resuscitation at Birth UHL Neonatal Guideline
- Blood Transfusion UHL Policy
- Cardiopulmonary Resuscitation Policy UHL LLR Alliance LPT
- Fetal Monitoring in Labour UHL Obstetric Guideline

2. Maternal collapse:

Maternal collapse is a life threatening emergency caused by an acute cardiovascular, respiratory or central nervous system failure occurring at any stage of pregnancy or until 6 weeks postpartum. It can lead to cardiac arrest if unsuccessfully treated.

Although a relatively rare event, it is vital to be prepared and act quickly in this acute emergency. Physiological changes in pregnancy as well as the complexity of treating a mother and foetus simultaneously, while prioritising the life of the mother, make the management of maternal collapse complicated.

Maternal collapse resuscitation should follow the Resuscitation Council (UK) guidelines using the standard ABCD approach, with modifications for maternal physiology, in particular relief of aortocaval compression.

All medical and midwifery staff should be trained to a nationally recognised level:(Basic Life Support, Immediate Life Support or Advanced Life support as appropriate). Emergency drills for maternal resuscitation should be regularly practiced. These drills should include the identification of the equipment required and appropriate methods for ensuring that cardiac arrest teams know the location of the maternity unit and theatres to arrive promptly.[1]

Collapse in an obstetric patient should be treated the same as in a non- pregnant patient with following caveats:

***AIRWAY**
There is an increased risk of regurgitation of gastric contents. Early tracheal intubation with cricoid pressure decreases this risk.

***CIRCULATION**
Avoid aorto-caval compression by displacing the uterus. This becomes more significant in pregnancies beyond 20 weeks gestation but may be relevant at earlier gestations if the size of the gravid uterus is enlarged (e.g., twin pregnancy, polyhydramnios, foetal macrosomia).
This can be minimized by manual uterine displacement (MUD). Add Left lateral tilt (15-30°) only if feasible and there is increasing evidence that suggests that manual uterine displacement (MUD) is more effective at relieving aortocaval compression. [2,3,6]
MUD is best implemented by a rescuer positioned on the patient's left side and by using two hands to lift the uterus leftwards and upwards (toward the ceiling).

***PERIMORTEM CAESAREAN SECTION (PMCS) or Resuscitative hysterotomy**
Start preparing for emergency LSCS as the foetus will need to be delivered if initial resuscitation efforts fail. PMCS should not be delayed by moving the patient. If there is no return of spontaneous circulation within 3- minutes, consider perimortem caesarean section with delivery within 5 minutes of the cardiac arrest.

2.1 Immediate management

In the case of sudden maternal collapse appropriate help should be sought. It is important to maintain an airway and the circulation, and ensure oxygenation whilst help is awaited.

If a pregnant woman collapses the following should occur immediately:

- Call for Help: Activate the emergency buzzer and Crash call Obstetric Registrar and SHO, Anaesthetic Registrar / SHO and Senior Registrar as well as the extended cardiac arrest team (2222)
- Think ABCD and Summon Crash Trolley

A. Airway: Ensure airway is open and administer supplemental high flow oxygen. Early tracheal intubation if unconscious.

B. Breathing: If airway clear and no breathing, commence bag mask ventilation or insertion of Supraglottic airway until intubation can be achieved. If airway is clear and no breathing, start chest compressions immediately.

C. Cardiac: If no pulse evident, then start chest compressions.

D. Displacement: Ensure uterus does not cause aortocaval compression by manually displacing the uterus laterally. MUD is best implemented by a rescuer positioned on the patient's left side and by using two hands to lift the uterus leftwards and upwards (toward the ceiling) [2]

Anaesthetic Consultant and Obstetric Consultant to be in attendance.

2.2 Reversible causes

Reversible causes 4Hs and 4Ts (adapted from Resuscitation Council UK guidelines 2021) [4]

Hypoxia
Hypovolemia
Hypo-/ Hyperkalemia/Metabolic
Hypothermia

Thrombosis- coronary or pulmonary
Tamponade- cardiac
Toxins
Tension pneumothorax

In the case of any pregnant woman in labour, undergoing Caesarean section, ERPC, or who collapses suddenly within 30 minutes of delivery, the following differential diagnoses should be considered:

- Embolism: amniotic fluid embolism (AFE)
- Drugs including anaesthesia (Magnesium or Local anaesthetic toxicity, High or Total spinal)
- Uterine atony, Uterine rupture
- Cardiac disease (Myocardial infarction/Ischemia/Aortic dissection/Cardiomyopathy)
- Hypertension/Pre-eclampsia/Eclampsia
- Anaphylactic shock, Aspiration pneumonitis
- Placenta abruption/Previa
- Sepsis
- DIC
- Neurological causes: Stroke, ICH

If no other cause is identified the woman should be treated as having an amniotic fluid embolism and treated accordingly.[5]

2.3 Immediate resuscitation procedures

In the case of sudden maternal collapse immediate resuscitation procedures and the following investigations should be instituted:

Immediate resuscitative procedures should follow the current Resuscitation Council (UK) guidelines. [4]
See Appendix I, II & III
There should be no alterations in algorithm drugs or doses used in the Resuscitation Council (UK) protocols. The same defibrillation energy levels should be used as in a non-pregnant woman.
Common reversible causes of maternal cardiopulmonary collapse/arrest should be considered throughout the resuscitation process.

The resuscitation of the patient should commence at the time of collapse and then be continued in the operating theatre if appropriate as soon as it is possible to move the patient.
Two wide-bore peripheral cannulae should be inserted.

Investigations:

Blood should be taken for:

- Arterial blood gas
- FBC
- Clotting /TEG
- U & E's
- Urate
- LFT's
- Blood sugar
- Cross match - 6 units of blood

The on-call consultant obstetrician, obstetric anaesthetist, haematologist and intensivist should be informed and involved in management- MASSIVE OBSTETRIC HAEMORRHAGE should be declared where appropriate. Volume replacement of rapidly infused intravenous fluids 1-2 litres should be administered, although caution should be exercised in the context of pre-eclampsia and eclampsia. (RCOG Green-top guidelines No.56)

2.4 Perimortem caesarean section

Preparation for a Perimortem Caesarean section or Resuscitative hysterotomy should occur immediately when CPR commences, particularly if gestational age is >20 weeks or the uterus is palpable at or above the umbilicus so that the procedure can be completed within 5 minutes to facilitate maternal resuscitation.

Perimortem caesarean section (PMCS)
This involves delivery of the fetus to relieve aortocaval compression and aid resuscitation of the mother by improving respiratory mechanics, venous return, and oxygen demand.
Preparation for this should begin on commencing life support to achieve skin incision by 4 minutes into the arrest with delivery of the fetus by 5 minutes.
The greatest benefit is likely to occur in women beyond 24 weeks gestation, but it should be considered at earlier gestations if there is concern about aortocaval compression from the gravid uterus.
Chest compressions should be continued throughout the procedure and surgeons must use the fastest technique they are familiar with – perimortem surgical packs are located on the resuscitation trolleys in obstetric areas.

- Unless the woman responds to resuscitation, a decision to deliver by Caesarean section should be made by 3-minutes, KTS by 4minutes and delivery achieved by 5 minutes.[4,6] Adult life support techniques must be maintained during the delivery. (Below 20 weeks of gestation urgent delivery is not indicated as maternal cardiac output is unlikely to be compromised by the gravid uterus.)

- If resuscitation has been successful in women >24 weeks gestation, Caesarean section should be considered as soon as the woman is stable (depending on underlying cause)

2.5 ITU transfer

If sudden cardiorespiratory collapse occurs, especially if AFE or massive pulmonary embolism is suspected, both ITU and the Department of Haematology should be informed.
Arrangement should be made for transfer to ITU as soon as stable.

- If a cardiorespiratory collapse occurs, which may include AFE as the cause; the patient will need care in ITU, according to ITU guidelines
- ITU should be informed as soon as possible of the need for transfer. Please complete an ITU Transfer Form.
- Adequate and prompt treatment of DIC requires early contact with senior medical staff within the Department of Haematology.
- Where massive pulmonary embolism is suspected, please follow guidance on 'Thrombolytic therapy in pulmonary embolism'. The consultant haematologist and Interventional radiologist should be contacted as soon as the diagnosis is suspected.

2.6 Amniotic Fluid Embolism (AFE)

If AFE is suspected or proved the UK National Registry for AFE should be contacted.

A confidential register of all cases of AFE has been established for the United Kingdom [7,8] The aim is to identify any differences or common factors between survivors and fatalities, which may help to reduce maternal deaths from this condition.

The entry criteria are:

- Acute hypotension or cardiac arrest
- Acute hypoxemia (dyspnoea, cyanosis, or respiratory arrest)
- Coagulopathy (laboratory evidence of intravascular coagulation or severe haemorrhage)
- Onset of all the above during labour, Caesarean section or within 30 minutes of delivery
- No other clinical condition or potential explanation for the symptoms and signs

All cases of suspected or proven amniotic fluid embolism, whether fatal or not, should be reported to the National Amniotic Fluid Embolism Register: UKOSS, National Perinatal Epidemiology Unit, University of Oxford, Old Road Campus, Old Road, Headington, Oxford OX3 7LF.
Email: ukoss@npeu.ox.ac.uk

2.7 Post resuscitation

Post resuscitation care should include ongoing monitoring in suitable environment i.e. ITU; Completing Documentation; Duty of Candour; Debriefing of staff; Datix

The patient will need ongoing monitoring in the Adult Special Care Unit (ASCU) or referral to an intensive care for organ support. Continue to review correctable factors – order FBP, U&E, LFT, Coagulation studies, TEG, ABG, ECG, and CXR.
If a perimortem caesarean section was performed, then transfer to theatre for wound closure.
There is limited evidence for the use of therapeutic hypothermia following maternal collapse but in

some patient circumstances, it may be appropriate to institute this in an intensive care environment.
Documentation of the resuscitation should include a list of people in attendance, a temporal record of drugs and interventions administered as well as completion of the Datix incident reporting.
A family meeting should provide a factual account of events and include senior staff representatives from obstetrics, midwifery, and anaesthesia.
A formal debrief should occur for all staff involved in the resuscitation.

3. Education and Training

None

4. Monitoring Compliance

None

5. Supporting References

Guideline Development Methodology:

Extensive literature searches were undertaken of the Cochrane, CINAHL, MEDLINE, and Embase databases. Few papers were identified of appropriate trials on which to base recommendations on management of emergencies. A textbook search was performed, and the following texts chosen to support recommendations: Dewhurst's Textbook of Obstetrics and Gynaecology for Postgraduates, 5th edition (1995) ed. C Whitfield, Oxford: Blackwell

- Obstetrics (1989) eds. Sir Alex Turnbull, Geoffrey Chamberlain. Edinburgh: Churchill Livingstone
- Obstetrics and the Newborn 3rd. Edition (1997) eds. NA Beischer, EV Mackay, PB Colditz
- Fundamentals of Obstetrics and Gynaecology 6th Edition (1998) Derek Llewellyn-Jones. London: Mosby

1. Report in confidential enquiries into maternal deaths in the United Kingdom 2000-2002.
2. Lipman S et al The society for obstetric anaesthesia and perinatology consensus statement on the management of cardiac arrest in pregnancy. *Anesthesia and Analgesia*. 2014; 118:5
3. Goodwin APL, Pearce AJ. The human wedge. A manoeuvre to relieve aortocaval compression during resuscitation in late pregnancy. Anaesthesia 1992; **47:433**.
4. Resuscitation Council UK Guidelines – 2021
5. Metodiev Y, Ramasamy P, Tuffnell D. Amniotic fluid embolism. *BJAed* 2018; 18:234-238
6. A.M. Madden, M.-L. Meng. Cardiopulmonary resuscitation in the pregnant patient. BJA Education2020; 20(8): 252-258
7. Clark SL, Hankins GDV, Dudley DA, Dildy GA, Flint Porter T. Amniotic fluid embolism: Analysis of the national registry. *Am J Obstet Gynecol* 1995;**172**:1158-69

8. Tuffnell, D.J. (2005) United Kingdom Amniotic Fluid Embolism Register. BJOG: **12** (12), 1625-1629

6. Key Words

Amniotic Fluid Embolism, Emergency, Perimortem caesarean section, Resuscitation

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The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

CONTACT AND REVIEW DETAILS			
Original Author - Original Working Party **Guideline Lead (Name and Title)** A Jacob – Consultant T Thanthrige – Anaesthetic Specialty Doctor			**Executive Lead** Chief Medical Officer
Details of Changes made during review:			
Date	**Issue Number**	**Reviewed By**	**Description Of Changes (If Any)**
12.06.14	**2**	P Ramasamy - Consultant Anaesthetist	No change
16.03.17	**3**	P Ramasamy	Recommendation 1; 4; 7
31.10.19	**4**	P Ramasamy, H Corner	Updated references no.2,4,5 Reversible causes added to recommendation 2 Recommendation 4- decision for PCS by 3 mins
March 2023	**5**	A Jacob – Consultant T Thanthrige – Anaesthetic Specialty Doctor	Introduction updated to include; Physiological changes in pregnancy, treating both mother and baby, removed statement re-wasting time preparing sterile field in cases of perimortem C/S. Updated ABCD guidance and amended Anaesthetic & Obstetric Consultants must attend rather than be informed. New statement stating that Resus council protocols /algorithms should not be altered. ECG removed form investigations, TEG added. Volume replacement statement added

Appendix 1: Resus council UK obstetric cardiac arrest

Obstetric Cardiac Arrest

Resuscitation Council UK | MBRRACE-UK

Alterations in maternal physiology and exacerbations of pregnancy related pathologies must be considered. Priorities include calling the appropriate team members, relieving aortocaval compression, effective cardiopulmonary resuscitation (CPR), consideration of causes and performing a timely emergency hysterotomy (perimortem caesarean section) when ≥ 20 weeks.

START

1. **Confirm cardiac arrest** and **call for help. Declare 'Obstetric cardiac arrest'**
   - Team for mother and team for neonate if > 20 weeks
2. **Lie flat, apply manual uterine displacement to the left**
   - Or left lateral tilt (from head to toe at an angle of 15–30° on a firm surface)
3. **Commence CPR** and request **cardiac arrest trolley**
   - Standard CPR ratios and hand position apply
   - **Evaluate potential causes (Box A)**
4. **Identify team leader, allocate roles including scribe**
   - Note time
5. **Apply defibrillation pads and check cardiac rhythm** (defibrillation is safe in pregnancy and no changes to standard shock energies are required))
   - if VF / pulseless VT ➔ defibrillation and first adrenaline and amiodarone after 3rd shock
   - If PEA / asystole ➔ resume CPR and give first adrenaline immediately
   - Check rhythm and pulse every 2 minutes
   - Repeat adrenaline every 3-5 minutes
6. **Maintain airway and ventilation**
   - Give 100% oxygen using bag-valve-mask device
   - Insert supraglottic airway with drain port *–or–* tracheal tube if trained to do so (intubation may be difficult, and airway pressures may be higher)
   - Apply waveform capnography monitoring to airway
   - If expired CO_2 is absent, presume oesophageal intubation until absolutely excluded
7. **Circulation**
   - I.V. access above the diaphragm, if fails or impossible use upper limb intraosseous (IO)
   - See **Box B** for reminders about drugs
   - Consider extracorporeal CPR (ECPR) if available
8. **Emergency hysterotomy (perimortem caesarean section)**
   - Perform if ≥ 20 weeks gestation, to improve maternal outcome
   - Perform immediately if maternal fatal injuries or prolonged pre-hospital arrest
   - Perform by 5 minutes if no return of spontaneous circulation
9. **Post resuscitation from haemorrhage - activate Massive Haemorrhage Protocol**
   Consider uterotonic drugs, fibrinogen and tranexamic acid
   Uterine tamponage / sutures, aortic compression, hysterectomy

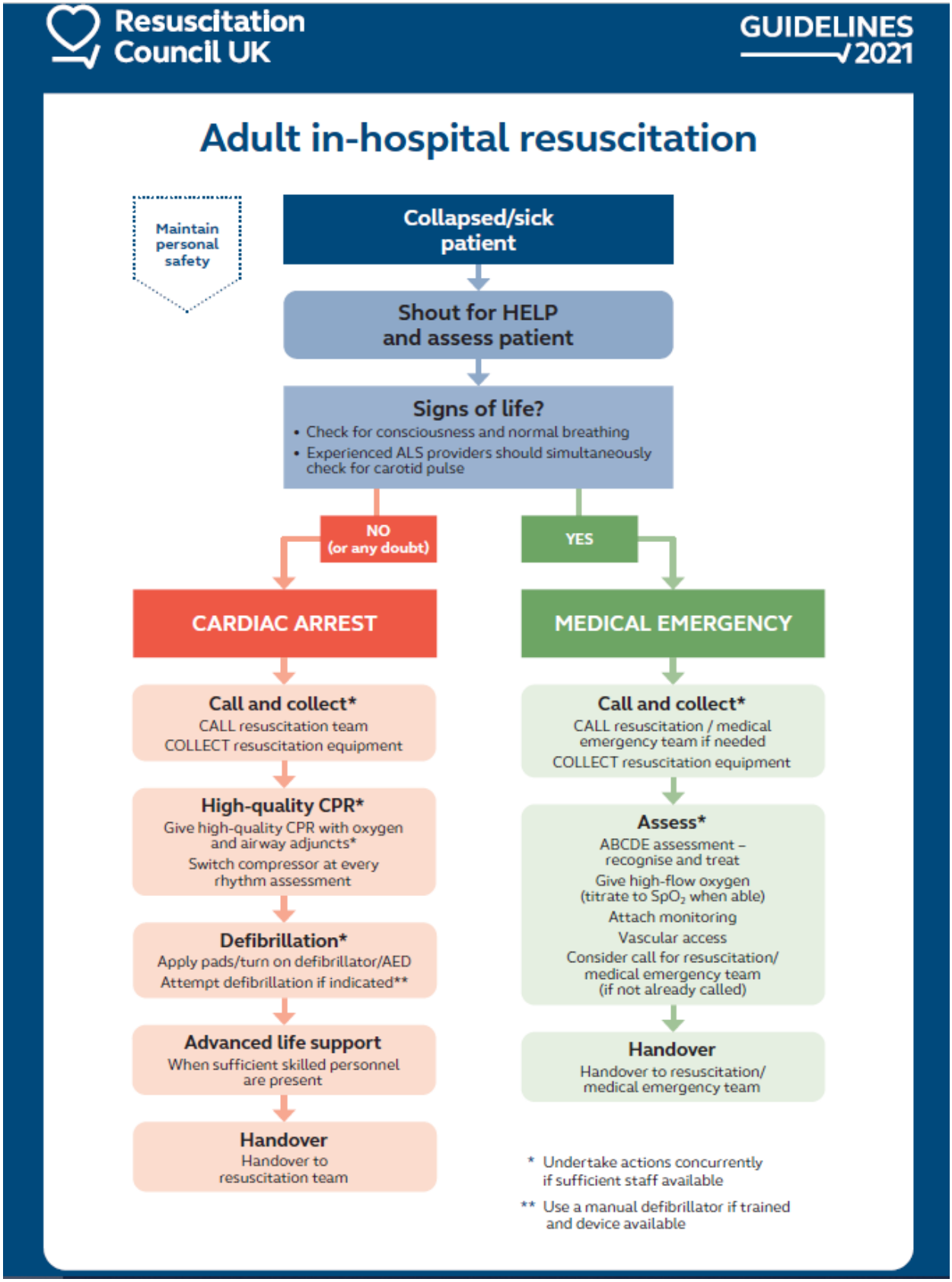
Version 1.1

Box A: POTENTIAL CAUSES *4H's and 4T's* (specific to obstetrics)	
Hypoxia	Respiratory – Pulmonary embolus (PE), Failed intubation, aspiration Heart failure Anaphylaxis Eclampsia / PET – pulmonary oedema, seizure
Hypovolaemia	Haemorrhage – obstetric (remember concealed), abnormal placentation, uterine rupture, atony, splenic artery/hepatic rupture, aneurysm rupture Cardiac – arrhythmia, myocardial infarction (MI) Distributive – sepsis, high regional block, anaphylaxis
Hypo/hyperkalaemia	Also consider blood sugar, sodium, calcium and magnesium levels
Hypothermia	
Tamponade	Aortic dissection, peripartum cardiomyopathy, trauma
Thrombosis	Amniotic fluid embolus, PE, MI, air embolism
Toxins	Local anaesthetic, magnesium, illicit drugs
Tension pneumothorax	Entonox in pre-existing pneumothorax, trauma

Box B: IV DRUGS FOR USE DURING CARDIAC ARREST	
Fluids	**500 mL IV** crystalloid bolus
Adrenaline	**1 mg IV** every 3-5 minutes in non-shockable or after 3rd shock
Amiodarone	**300 mg IV** after 3rd shock
Atropine	**0.5-1 mg IV** up to 3 mg if vagal tone likely cause
Calcium chloride	**10% 10 mL** IV for Mg overdose, low calcium or hyperkalaemia
Magnesium	**2 g IV** for polymorphic VT / hypomagnesaemia, **4 g IV** for eclampsia
Thrombolysis/PCI	For suspected massive pulmonary embolus / MI
Tranexamic acid	**1 g** if haemorrhage
Intralipid	**1.5 mL kg^{-1} IV** bolus and **15 mL kg^{-1} hr^{-1} IV** infusion

Obstetric Anaesthetists' Association — Promoting the highest standards of anaesthetic practice in the care of mother and baby — GUIDELINES 2021

Appendix 2: Resus council UK algorithm- in hospital resus



Appendix 3: Resus council UK algorithm- ALS