

Obstetric Emergencies - Full Clinical Guideline

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Contents

Section		Page
1	Introduction	1
2	Purpose and Outcomes	1
3	Key Responsibilities and Duties	1
4	Abbreviations	2
5	Cord Prolapse	2
6	Acute Uterine Inversion	4
7	Shoulder Dystocia	6
8	Maternal Collapse/Maternal Cardiac Arrest	8
9	Anaphylaxis	13
10	Anaesthetic Emergencies	14
11	Monitoring Compliance and Effectiveness	15
12	References	15
Appendix A	Cord Flowchart	16
Appendix B	Uterine Inversion Management Flowchart	17
Appendix C	Algorithm for the Management of Shoulder Dystocia	18
Appendix D	Obstetric Cardiac Arrest	19
Appendix E	CPR Flowchart	20
Appendix F	Local Anaesthetic Toxicity	21
Appendix G	Anaphylaxis Flowchart	22
	Documentation Control	23

1. Introduction

Obstetric emergencies are important aspect of core obstetric practice. There should be a structured approach to managing these emergencies.

2. Purpose and Outcomes

This guide is meant to be used as a structured approach and form a drill that is rehearsed and practiced regularly at training forums.

This should be encompassed in regular updates as part of mandatory training.

Emphasis on the multiprofessional team which delivers care to our patients especially in an emergency situation .

This guide is **NOT** to replace knowledge and skills updates

This guide is **NOT** exhaustive - and does not set out to cover all eventualities

3. Key Responsibilities and Duties

- All professionals caring for pregnant patients
- Completion of appropriate documentation
- Incident Reporting

4. Abbreviations

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ARM	-	Artificial Rupture of Membranes
AVPU	-	Alert, Responds to Voice, Responds to Pain, Unresponsive
BPI	-	Brachial Plexus Injury
CPR	-	Cardio-Pulmonary Resuscitation
CTG	-	Cardiotocography
DCC	-	Delayed Cord-Clamping
LFT	-	Liver Function Test
PMCS	-	Peri-Mortem Caesarean Section
U+E	-	Urea and Electrolytes

5. Cord Prolapse

Cord prolapse has been defined as the descent of the umbilical cord through the cervix alongside, (occult) or past (overt) the presenting part in the presence of ruptured membranes.

Cord presentation is the presence of the umbilical cord between the fetal presenting part and the cervix, with or without intact membranes.

The overall incidence of cord prolapses ranges from 0.1–0.6%. In the case of breech presentation, the incidence is higher at 1%.

5.1 Causes of Cord Prolapse

General	Procedure-related
Multiparity	Artificial rupture of membranes with high presenting part
Low birthweight (< 2.5 kg)	Vaginal manipulation of the fetus with ruptured membranes
Preterm labour (< 37 ⁺⁰ weeks)	External cephalic version (during procedure)
Fetal congenital anomalies	Internal podalic version
Breech presentation	Stabilising induction of labour
Transverse, oblique and unstable lie*	Insertion of intrauterine pressure transducer
Second twin	Large balloon catheter induction of labour
Polyhydramnios	
Unengaged presenting part	
Low-lying placenta	

*Unstable lie is when the longitudinal axis of the fetus (lie) is changing repeatedly after 37⁺⁰ weeks.

5.2 Prevention

With transverse, oblique, or unstable lie, elective admission to hospital after 37+0 weeks of gestation should be discussed and women in the community should be advised to present urgently if there are signs of labour or suspicion of membrane rupture.

Routine ultrasound examination is not sufficiently sensitive or specific for identification of cord presentation antenatally and should not be performed to predict increased probability of cord prolapse.

Selective ultrasound screening can be considered for women with breech presentation at term who are considering vaginal birth.

Women with non-cephalic presentations and preterm, pre-labour rupture of membranes should be recommended inpatient care.

Artificial rupture of Membranes (ARM) should be avoided whenever possible if the presenting part is mobile and/or high.

If it becomes necessary to rupture the membranes with a high presenting part, this should be performed with arrangements in place for immediate caesarean section. Ensure theatre is free and no potential patient awaiting surgery.

Upward pressure on the presenting part should be kept to a minimum in women during vaginal examination (VE) and other obstetric interventions in the context of ruptured membranes because of the risk of upward displacement of the presenting part and cord prolapse.

ARM should be avoided if on VE the cord is felt below the presenting part. When cord presentation is diagnosed in established labour, caesarean section is usually indicated.

5.3 Management (see flowchart in Appendix A)

Cord prolapse should be suspected when there is an abnormal fetal heart rate pattern, especially if such changes commence soon after membrane rupture, either spontaneous or artificial.

Speculum and/or digital vaginal examination should be performed when cord prolapse is suspected. When spontaneous rupture of membranes occurs, if there is abnormal fetal heart rate monitoring and there are no risk factors for cord prolapse, then a routine VE is not indicated.

When cord prolapse is diagnosed before full dilatation, assistance should be immediately called, and preparations made for immediate birth in theatre.

To prevent vasospasm, there should be minimal handling of loops of cord lying outside the vagina.

To prevent cord compression:

- Presenting part be elevated either manually or
- Filling the urinary bladder.
- mother adopting the knee–chest or left lateral (preferably with head down and pillow under the left hip) position.

Tocolysis can be considered while preparing for caesarean section if there are persistent fetal heart rate abnormalities.

Although the measures described above are potentially useful during preparation for birth, they must not result in unnecessary delay.

Expectant management should be discussed for cord prolapse complicating pregnancies with a gestational age at the threshold of viability (23+0 to 24+6 weeks).

A category 1 caesarean section is the recommended mode of delivery in cases of cord prolapse when vaginal birth is not imminent, with the aim of achieving birth within 30 minutes or less if the cord prolapse is associated with a suspicious or pathological fetal heart rate pattern but without compromising maternal safety.

Category 2 caesarean birth can be considered for women in whom the fetal heart rate pattern is normal, but continuous assessment of the fetal heart trace is essential. If the cardiotocograph (CTG) becomes abnormal, re-categorisation to category 1 birth should immediately be considered.

Discussion with the anaesthetist should take place to decide on the appropriate form of anaesthesia. Regional anaesthesia can be considered in consultation with an experienced anaesthetist.

Verbal consent is satisfactory for category 1 caesarean section.

Vaginal birth, in most cases operative, can be attempted at full dilatation if it is anticipated that birth would be accomplished quickly and safely, using standard techniques, and taking care to avoid impingement of the cord when possible.

Breech extraction is appropriate under some circumstances, for example, after internal podalic version for a second twin.

A practitioner competent in the resuscitation of the newborn should attend all births that follow cord

prolapse. Paired cord blood samples should be taken for pH and base excess measurement.

Delayed cord clamping can be considered if a baby is uncompromised at birth. Immediate resuscitation should take priority over DCC when the baby is unwell at birth.

6. **Acute Uterine Inversion**

A uterine inversion is a rare event, complicating about 1 in 2000 to 1 in 23,000 deliveries. Ironically, most are seen with “low-risk” deliveries. The incidence of uterine inversion has decreased four-fold after the introduction of active management during the third stage.

Uterine inversion occurs when the uterine fundus collapses into the endometrial cavity, turning the uterus partially or completely inside out. It is a rare complication of vaginal or caesarean delivery, but when it occurs, it is a life-threatening obstetric emergency. If not promptly recognized and treated, uterine inversion can lead to severe haemorrhage and shock, which may result in maternal collapse.

6.1 **Classification**

Uterine inversions are classified by the extent of inversion and time of occurrence.

Extent of inversion:

- 1st degree (also called incomplete) – The fundus is within the endometrial cavity
- 2nd degree (also called complete) – The fundus protrudes through the cervical os
- 3rd degree (also called prolapsed) – The fundus protrudes to or beyond the introitus
- 4th degree (also called total) – Both the uterus and vagina are inverted

Time of occurrence:

- Acute – Within 24 hours of delivery
- Subacute – More than 24 hours but less than four weeks postpartum
- Chronic – ≥ 1 month postpartum

6.2 **Risk Factors**

- Macrosomia
- Rapid or prolonged labour and delivery
- Short umbilical cord
- Severe pre-eclampsia
- Uterine anomalies or tumors (leiomyoma - fibroid)
- Nulliparity
- Use of uterine relaxants
- Retained placenta
- Placenta accreta spectrum

6.3 **Clinical Presentation**

The clinical presentation depends on the extent and time of occurrence of the inversion.

Signs and symptoms include one or more of the following:

- Mild to severe vaginal bleeding
- Mild to severe lower abdominal pain
- A smooth, round mass protruding from the cervix or vagina
- Urinary retention

The most common presentation is complete uterine inversion with severe postpartum haemorrhage, often leading to hypovolemic shock. Shock out of proportion to blood loss has been described and attributed to increased vagal tone from stretching of the pelvic parasympathetic nerves (neurogenic shock), but this cause can lead to underestimation of blood loss. In patients with significant vaginal bleeding, treatment should not be delayed for radiological confirmation.

6.3.1 **How to identify uterine inversion**

On vaginal examination, the inverted fundus fills the vagina. On transabdominal palpation, the uterine fundus is absent from its expected periumbilical position. With severe prolapse, the inverted uterus is seen protruding at the perineum.

6.3.2 Incomplete uterine inversion

Approximately 10% of cases are associated with more subtle findings.

- Blood loss may be minimal
- Examination through the dilated cervix reveals a mass (Eg: fundus) in the uterine cavity
- On abdominal examination, a cup-like defect (fundal notch) may be palpated in the area of the normally globular fundus
- In the absence of heavy bleeding or careful examination of the fundus, these patients may not be identified for days or weeks
- Because of increasing cervical constriction over time, delayed recognition of inversion is more likely to require surgical intervention to replace the uterus, and the uterus may become oedematous and infected

6.3.3 Differential diagnosis

The most common disorder in differential diagnosis is a prolapsed fibroid.

6.4 Management (see flowchart in Appendix B)

Goals

1. Replace the uterine fundus to its correct position
2. Manage postpartum haemorrhage and shock, if present
3. Prevent recurrent inversion

Initial Management

- Discontinue uterotonic drugs
- Call for immediate assistance
- Establish adequate intravenous access and aggressive fluid/blood product resuscitation. Two large bore intravenous lines (eg, at least one intravenous catheter should be 16-gauge) and begin infusion of crystalloid to support blood pressure. Bloods – FBC, Coagulation screen including fibrinogen, U&E's, LFT's
- Blood products should be administered, as needed, to treat hypovolemia and prevent cardiovascular collapse, and reverse coagulopathy, if present.
- **Do not remove the placenta.**
- Immediately attempt to manually replace the inverted uterus to its normal position. This is best accomplished by placing a hand inside the vagina and pushing the fundus along the long axis of the vagina toward the umbilicus -Johnson manoeuvre.
- If a constriction ring is palpable, pressure should be applied to the part of the fundus nearest the ring to ease it through from bottom to top. This avoids attempting to push a wider diameter of the fundal mass through the ring, which is likely to fail.
- Attempts at manual replacement may be accompanied by severe bleeding.
- **If failed, transfer patient to theatre immediately**
- In hemodynamically stable patients, administer uterine relaxants when immediate uterine replacement is unsuccessful. Manual replacement is then reattempted.
 - Terbutaline (0.25 milligrams subcutaneously)
 - Magnesium sulphate 4g over 5 min - has a slow onset of action

Other techniques for re-positioning:

- **Hydrostatic repositioning (O' Sullivan's technique)**
 - The patient is placed in lithotomy position
 - Uterine rupture must be excluded first
 - A bag of warmed fluid is hung at least 2 meter above the patient and allowed to flow by gravity or with light pressure through tubing connected to a silastic ventouse cup in to the posterior fornix of vagina; the seal between the perimeter of the cup and the vagina prevents significant leakage
 - The resulting intravaginal hydrostatic pressure may force the inverted fundus back to its normal position. Two litres of warm saline fluid may be needed and can take up to 10-15min
 - A hard, black, rubber anaesthetic facemask can be used, which may fit over the vulva. The oxygen inlet allows access for fluid input.

- **Surgical Intervention — If the above measures to replace the uterus fail, attempt surgical correction of the inversion.**
 - At laparotomy, in place of the uterus, a constriction ring containing a dimple or cup or slit is often observed, and the adnexa (fallopian tubes, round ligaments, and possibly one or both ovaries) are typically pulled into this hole.
- **Huntington procedure**
 - Locate the cup formed by the inversion
 - Place a clamp, such as an Allis or Babcock clamp, on each round ligament entering the cup, approximately 2 cm deep in the cup. Clamp the myometrium if the round ligaments cannot be identified.
 - Gently pull on the clamps to exert upward traction on the inverted fundus
 - Repeatedly clamp in 2 cm increments along the ligament and exert traction until the inversion is corrected. This procedure is similar to the hand-over-hand movements used when pulling up an anchor line.
 - If available, a second operator can place a hand in the vagina and apply upward pressure on the fundus to facilitate the procedure, or they can pull one of the clamps while the first operator pulls the other clamp.
- **Haultain procedure**
 - Make an incision (approximately 1.5 inches in length) in the posterior surface of the uterus to transect the constriction ring and thus increase the size of the previously constricted area. Surgical release of the constriction ring should allow manual reduction of the uterine inversion. A posterior incision to an anterior incision reduces the risk of accidental cystotomy.
 - Manual reduction can be performed through the vagina or by placing a finger abdominally through the myometrial incision to below the fundus and then exerting pressure on the fundus to reduce the inversion.
 - The incision is repaired when the uterus has been returned to a normal position.

6.5 Management of Placenta

- Do not remove the placenta until the uterus has been replaced.
- Removing the placenta before replacing the uterus increases blood loss, which may be severe.
- Leaving the placenta in situ rarely interferes with the operator's ability to restore the uterus to its normal position, provided that the patient has appropriate anaesthesia.
- After the uterus has been replaced, the most conservative approach is to await spontaneous separation of the placenta and reserving manual extraction for usual obstetric indications (eg, hemorrhage, prolonged third stage).

6.6 Management after Correction of Inversion

- Hold the uterus in place – After the uterus has been replaced, the fundus should be held in place and then monitored until the surgeon is sure that the uterus is firm and its position is stable.
- Administer uterotonic drugs – Once placental removal has been successfully accomplished, uterotonic agents are administered to induce myometrial contraction and maintain uterine involution, thereby impeding reinversion and reducing the risk of hemorrhage.
- Reinversion — Treatment of reinversion is similar to that for the initial inversion. Can consider intrauterine balloon (Bakri Balloon) or uterine compression sutures to treat PPH and to further prevent recurrent inversion.
- Antibiotic prophylaxis as per Obstetric Infections - antibiotic guideline for manual removal of placenta but will need to continue the course. If surgical treatment, then use caesarean section prophylaxis. [opac-retrieve-file.pl \(koha-ptfs.co.uk\)](http://opac-retrieve-file.pl(koha-ptfs.co.uk))

7. Shoulder Dystocia

Shoulder dystocia is defined as a vaginal cephalic delivery that requires additional obstetric manoeuvres to deliver the fetus after the head has delivered and gentle traction has failed with an incidence of 0.5 % to 0.7%

Possible complications include:

Neonatal complications:

- Brachial plexus injuries
- Hypoxia
- Death
- Cerebral palsy
- Fractures of the clavicle, humerus, etc

Maternal complications:

- Postpartum bleeding
- Perineal lacerations that extend into the anal sphincter
- Pubic symphysis separation
- Neuropathy of lateral femoral cutaneous nerve
- Uterine rupture

7.1 Associated Risk Factors

Pre-labour	Intrapartum
Previous shoulder dystocia	Prolonged first stage of labour
Macrosomia >4.5kg	Secondary arrest
Diabetes mellitus	Prolonged second stage of labour
Maternal body mass index >30kg/m ²	Oxytocin augmentation
Induction of labour	Assisted vaginal delivery

7.2 Prevention

With induction of labour the risk of shoulder dystocia is reduced compared with expectant management, however,

1. with induction of labour the risk of third- or fourth-degree perineal tears is increased compared with expectant management
2. there is evidence that the risk of perinatal death, brachial plexus injuries in the baby, or the need for emergency caesarean birth is the same between the 2 options.
3. Elective CS should be considered in women with EFW of >4.5kg

7.3 Recognition

- Difficulty with delivery of face and chin
- The head remaining tightly applied to the vulva or retracting (turtle - neck sign)
- Failure of restitution of the fetal head
- Failure of shoulders to descend.

7.4 Management (see flowchart in Appendix C)

Shoulder dystocia should be managed systematically. Immediately after recognition of shoulder dystocia, additional help should be called.

- The problem should be stated clearly as 'this is shoulder dystocia' to the arriving team. **Fundal pressure should not be used.**
- McRoberts' manoeuvre is a simple, rapid and effective intervention and should be performed first.
- Suprapubic pressure should be used to improve the effectiveness of the McRoberts' manoeuvre.
- An episiotomy is not always necessary.

7.5 Optimal Management after Shoulder Dystocia

Birth attendants should be alert to the possibility of postpartum haemorrhage and severe perineal tears. Active third stage management with provision for 40units syntocinon infusion is recommended.

- Postpartum haemorrhage (11%)

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- Third- and fourth-degree perineal tears (3.8%)
- Vaginal lacerations
- Cervical tears
- Bladder rupture
- Uterine rupture
- Symphyseal separation
- Sacroiliac joint dislocation
- Lateral femoral cutaneous neuropathy.

The baby should be examined for injury by a neonatal clinician. BPI is one of the most important complications of shoulder dystocia, complicating 2.3% to 16% of such deliveries.

Other reported fetal injuries associated with shoulder dystocia include fractures of the humerus and clavicle, pneumothoraces and hypoxic brain damage.

An explanation of the delivery should be given to the parents.

Documentation should be accurate and comprehensive. It is important to document:

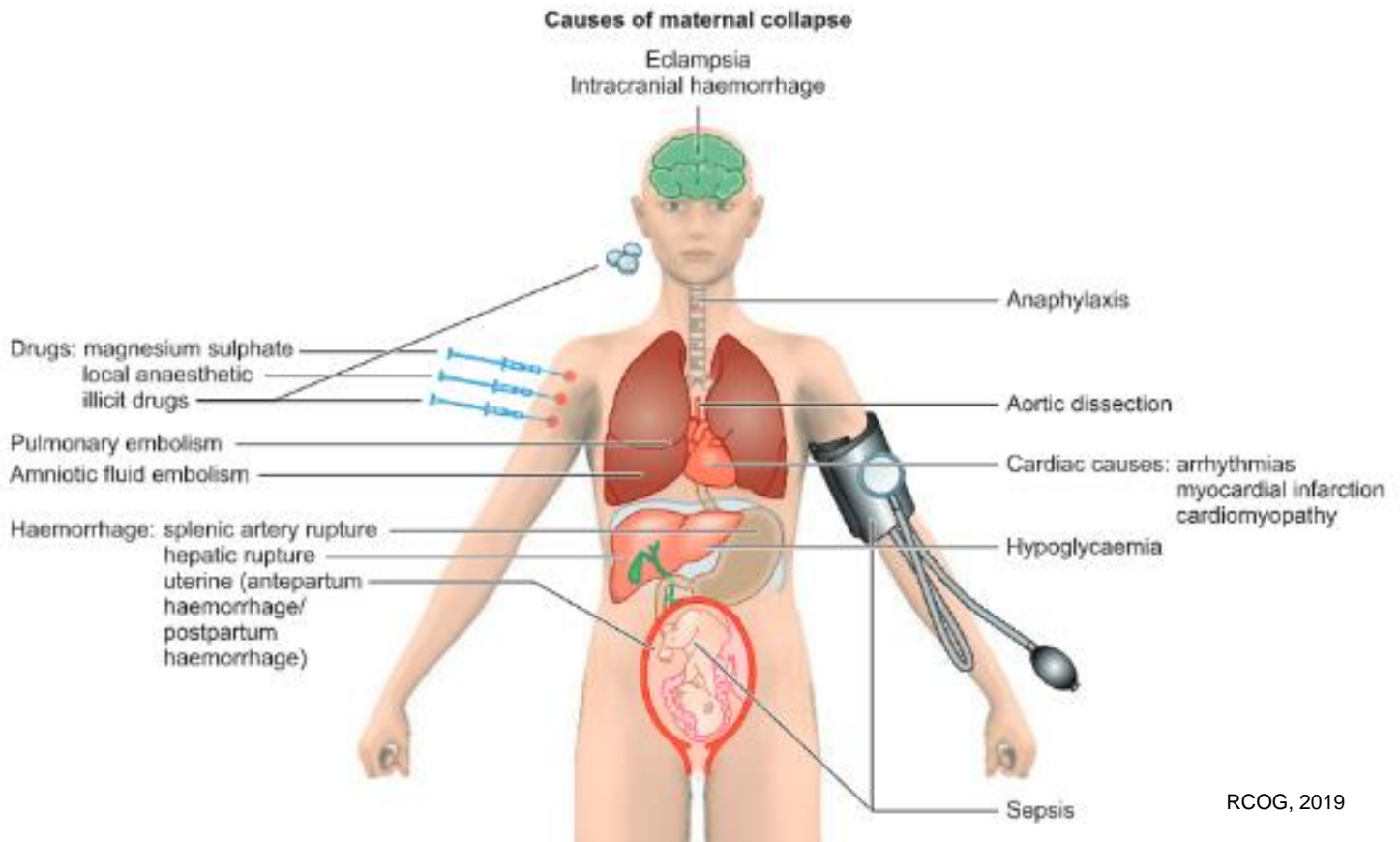
- Time of delivery of the head and the body
- Anterior shoulder at the time of dystocia
- Maneuvers performed, their time and sequence
- Maternal perineal and vaginal examination
- Estimated blood loss
- Staff in attendance and the time they arrived
- APGAR score of the baby
- Cord blood measurements
- Neonatal assessment of the baby

8. Maternal Collapse/Maternal Cardiac Arrest

Maternal collapse is defined as an acute event involving the cardiorespiratory systems and/or central nervous systems, resulting in a reduced or absent conscious level (and potentially cardiac arrest and death), at any stage in pregnancy and up to 6 weeks after birth. Importantly, if maternal collapse which is not as the result of cardiac arrest is not treated effectively, maternal cardiac arrest can then occur.

Whilst maternal collapse is such an uncommon event, the consequences are potentially devastating, therefore it is essential that the clinical team are skilled in initial effective resuscitation techniques and are able to investigate and diagnose the cause of the collapse to allow appropriate, directed ongoing management.

8.1 Causes of Maternal Collapse



Maternal collapse can result from many causes which may or may not be pregnancy related. A systematic approach to assessment facilitates identification of the cause of collapse. If the cause is reversible, the survival rates are greater and those for which specific treatment exists must be rapidly considered. A systematic ABCDE approach should enable the clinical team to identify the most common causes of collapse. These can be divided into the 4 'H's' and 4 'T's' (below). In pregnant women, eclampsia and intracranial haemorrhage should be added. Other specific obstetric causes could also be present and should be considered systematically.

Reversible cause	Cause in pregnancy
4H's Hypovolaemia	Bleeding (obstetric/other; may be concealed) or relative hypovolaemia of dense spinal block, septic or neurogenic block
Hypoxia	Pregnant women can become hypoxic more quickly. Cardiac events – peripartum cardiomyopathy, myocardial infarction, aortic dissection, large vessel aneurysms
Hypo/hyperkalaemia and Hyponatraemia	Hypo and hyperkalaemia are no more likely. Hyponatraemia may be caused by oxytocin use
Hypothermia	No more likely
4T's Thromboembolism	Amniotic fluid embolus, pulmonary embolus, air embolus, myocardial infarction
Toxicity	Local anaesthetic, magnesium, other
Tension pneumothorax	Following trauma/suicide attempts
Tamponade	Following trauma/suicide attempts
Eclampsia and pre-eclampsia	Includes intracranial haemorrhage

RCOG, 2019

Common causes of maternal collapse:

- Haemorrhage
- Thromboembolism
- Amniotic fluid embolism
- Intracranial haemorrhage
- Anaphylaxis
- Epilepsy

- Cardiac disease
- Sepsis
- Drug toxicity and overdose
- Eclampsia
- Vasovagal episode
- Metabolic / electrolyte disturbances
- Uterine inversion / rupture

8.2 Physiological Changes in Pregnancy and how they affect Resuscitation

Pregnant women undergo a variety of physiological changes that can accelerate the development of hypoxia and acidosis and make ventilation more difficult. These changes combined with other physical changes, make resuscitation during pregnancy more challenging. It is essential that anyone involved in the resuscitation of pregnant women is aware of the physiological differences. This includes pre-hospital care clinicians, paramedics and emergency medicine department staff.

System	Changes in pregnancy	Impact on resuscitation
Cardiovascular system		
Plasma volume	Increased by 50%	Dilutional anaemia Reduced oxygen carrying capacity
Heart rate	Increased by 15-20 bpm	Increased CPR demands
Cardiac output	Increased by 40% Significantly reduced by pressure of gravid uterus on IVC	Increased CPR circulation demands
Uterine blood flow	10% cardiac output at term	Potential for massive haemorrhage
Systemic vascular resistance	Decreased	Sequesters blood during CPR
Arterial blood pressure	Decreased by 10-15mmHg	Decreased reserve
Venous return	Decreased by pressure of gravid uterus on IVC	Increased CPR circulation demands Decreased reserve
Respiratory system		
Respiratory rate	Increased	Decreased buffering capacity, acidosis more likely
Oxygen consumption	Increased by 20%	Hypoxia develops more quickly
Residual capacity	Decreased by 25%	Hypoxia develops more quickly when apnoeic
Arterial pCO ₂	Decreased	Decreased buffering capacity, acidosis more likely
Laryngeal oedema	Increased	Difficult intubation
Other changes		
Gastric motility	Decreased	Increased risk of aspiration
Lower oesophageal sphincter	Relaxed	Increased risk of aspiration
Uterus	Enlarged	Diaphragmatic splinting reduces residual capacity and makes ventilation more difficult Aortocaval compression causes supine hypotension, reduces venous return and significantly impairs CPR
Weight	Increases	Large breasts may interfere with intubation, makes ventilation more difficult

8.3 Initial Management of Maternal Collapse

Maternal collapse resuscitation should follow the Resuscitation Council (UK) guidelines (Appendix D - please note, we do not declare 'obstetric cardiac arrest' at UHDB; see flowchart in Appendix D) using the standard ABCDE approach, with some modifications for maternal physiology, in particular relief of aortocaval compression.

In the event of maternal collapse, signs of life should be sought if the assessor is confident in this (check for breathing and carotid pulse). If the assessor is not confident or there is any doubt in the detection of signs of life, cardiopulmonary resuscitation should be commenced.

If signs of life are detected:

- Place the woman in the left lateral position
- Assess using the standardised ABCDE approach
- Assess for the need for oxygen
- Gain adequate intravenous access
- Undertake an AVPU assessment
- Rapidly identify and treat the cause of the maternal collapse to prevent potential progression into cardio-pulmonary arrest
- Perform ongoing regular A-E assessment until cause of collapse is treated
- Undertake assessment of fetal wellbeing after the ABCDE assessment
- Arrange for an obstetric review.

If the maternal collapse occurs in the community arrange for urgent transfer to hospital for ongoing management and obstetric review.

If no signs of life are detected:

- Staff present commence basic life support
- Cardiac arrest should be declared and an emergency 2222 call made stating the location of the cardiac arrest and requesting:
 - adult resuscitation team
 - obstetric emergency team
 - neonatal resuscitation team
- Consultant obstetrician and consultant anaesthetist should be called to attend.

If maternal collapse occurs in the community and there are no signs of life, the midwifery staff should commence basic life support and dial 999 for an emergency (paramedic) ambulance stating obstetric emergency, for rapid transfer to the emergency department. The paramedic team should pre-alert the hospital to ensure appropriate obstetric, midwifery, anaesthetic and neonatal staff (if undelivered and more than 22+0 weeks of gestation) are available on arrival.

8.4 Maternal Cardio-Pulmonary Resuscitation (CPR)

For flowchart - see Appendix E

If the airway is clear and there is no breathing, chest compressions should be commenced immediately, at a ratio of 30 chest compressions (100-120 / min) to 2 ventilation breaths.

Relieving Aortocaval compression

Aortocaval compression significantly reduces cardiac output from 20 weeks of gestation onwards and the efficacy of chest compressions during resuscitation.

- Manual displacement of the uterus to the left is effective in relieving aortocaval compression in women above 20 weeks gestation or where the uterus is palpable at or above the umbilicus. This permits effective chest compressions in the supine position. The technique should be performed using the "up, off and over" method.

- A left lateral tilt of the woman from head to toe at an angle of 15-30° on a firm surface will relieve aortocaval compression in the majority of pregnant women and still allow effective chest compressions to be performed.
- In cases of major trauma, the spine should be protected with a spinal board before any tilt is applied. In the absence of a spinal board, manual displacement of the uterus should be used.
- If there are two rescuers, one should be responsible for chest compressions and ventilation breaths, whilst the other should ensure aortocaval decompression with manual uterine displacement.

Airway and Breathing

- Supplemental high flow oxygen (10-15L/min) should be administered as soon as possible to counteract rapid desaturation.
- Bag and mask ventilation or insertion of a simple supraglottic airway should be undertaken until intubation can be achieved.
- Intubation in an unconscious woman with a cuffed endotracheal tube should be performed immediately by an experienced anaesthetist.
- Once intubation is performed, the ratio of chest compressions to ventilation breaths should be asynchronised. Ventilation should be at a rate of 10 breaths / min with continuous chest compressions at 100-120 / min.

Circulation and Drugs

- Two wide-bore cannulae (minimum 16G) should be inserted as soon as possible. If peripheral venous access is not possible, early consideration of central venous access, intraosseous access or venous cutdown should be considered.
- There should be an aggressive approach to volume replacement, although caution should be exercised in the context of pre-eclampsia or eclampsia.
- The same defibrillation energy levels should be used as in a non-pregnant woman.
- There should be no alteration in algorithm drugs or doses used in the Resuscitation Council (UK) protocols.

Ongoing resuscitation effort

- Common, reversible causes of maternal cardiopulmonary arrest should be considered throughout the resuscitation process.
- Resuscitation efforts should be continued until a decision is taken by the consultant obstetrician and consultant anaesthetist to discontinue resuscitation efforts. This decision should be made in consensus with the cardiac arrest team.

Perimortem Caesarean Section (PMCS)

- In women over 20 weeks of gestation, if there is no response to correctly performed CPR within 4 minutes of maternal collapse or if resuscitation is continued beyond this, then PMCS should be undertaken to assist maternal resuscitation. Ideally this should be achieved within 5 minutes of the collapse.
- Delivery of the fetus and placenta reduces oxygen consumption, improves venous return and cardiac output, facilitates chest compressions and makes ventilation easier. At less than 20 weeks of gestation there is no proven benefit from delivery of the fetus and placenta. PMCS should be considered a resuscitative procedure, to be performed primarily in the interests of maternal survival.
- PMCS should not be delayed by moving the woman. It should be performed where maternal collapse has occurred and resuscitation is taking place.
- The operator should use the incision which will facilitate the most rapid access. This may be a midline vertical incision or a suprapubic transverse incision.

- A scalpel and umbilical cord clamps (or alternative ligatures) should be available on the resuscitation trolley in all areas where maternal collapse may occur, including the accident and emergency department.
- If resuscitation is successful, there should be prompt transfer to an appropriate environment at that point, as well as anaesthesia and sedation, to allow closure of the uterus and abdomen in the usual way to control blood loss and minimise the risk of infection. Transfer should be supervised by an adequately skilled team with appropriate equipment.
- Where the resuscitation is not successful, the case should be discussed with the coroner to determine whether a postmortem is required before any medical devices, such as lines and endotracheal tubes are removed.

Team providing care

- In addition to the general arrest team, there should also be a senior midwife, an obstetrician and an obstetric anaesthetist included in the team in cases of maternal collapse. The most senior obstetrician and senior anaesthetist should be called early at the time of a cardiopulmonary arrest call. While managing the arrest, there must be dialogue between the team leader, the obstetrician and the obstetric anaesthetist as to how to best manage the pregnant woman.
- The neonatal team should be called early if delivery is likely (antepartum collapse over 22+0 weeks of gestation).
- Where the woman survives, a consultant intensivist should be involved as soon as possible.

8.5 Documentation

- Accurate documentation is essential in all cases of maternal collapse, whether or not resuscitation is successful. Contemporaneous note keeping is difficult in a resuscitation situation, unless someone is scribing. Those involved should then write full notes as soon as possible after the event.
- All cases of maternal collapse should generate a clinical incident form and the care should be reviewed through the clinical governance process.
- All cases of maternal death should be reported to MBRRACE-UK.

8.6 Training

- All generic life support training should consider the adaptation of CPR in pregnant women.
- All maternity staff should have annual formal multidisciplinary training in generic life support and the management of maternal collapse.

8.7 Debriefing

- Debriefing is recommended for the woman, the family and the staff involved in the event.
- Maternal collapse can be associated with post-traumatic stress disorder (for the woman, her family and for the staff involved), postnatal depression and tocophobia. Debriefing is an important part of holistic maternity care and should be offered by a competent professional to support the ongoing mental health of all concerned.

9. Anaphylaxis

Anaphylaxis is a severe, life-threatening generalised or systemic hypersensitivity reaction, resulting in respiratory, cutaneous and circulatory changes, and possibly gastrointestinal disturbance and collapse. Upper airway occlusion secondary to angioedema, bronchospasm and mucous plugging contribute to significant hypoxia and difficulties with ventilation.

Common triggers are a variety of drugs, latex, animal allergens and foods. Exposure to a known allergen may support the diagnosis, but many cases occur with no previous history.

Anaphylaxis is likely when all of the following three criteria occur:

- sudden onset and rapid progression of symptoms
- life-threatening airway and/or breathing and/or circulation problems
- skin and/or mucosal changes (flushing, urticaria, angioedema).

Mast cell tryptase levels can be useful in confirming the diagnosis. As a minimum, 1 sample at 1-2 hours after the start of symptoms should be taken, but ideally three samples - as soon as possible after resuscitation has started (without delaying resuscitation); 1-2 hours after the start of symptoms; 24 hours later.

9.1 Management (see flowchart in Appendix G)

The key points in the management are:

- ABCDE approach to assessment and resuscitation whilst calling for senior help
- Removal of all potential causative agents if possible
- Prompt administration of intramuscular adrenaline 500 micrograms (0.5ml 1:1000 adrenaline)

If the anaphylactic reaction occurs in the community, the patient should have basic life support and be transferred to a hospital as quickly as possible, unless a suitably trained healthcare professional is present with appropriate equipment and drugs in which case definitive resuscitation and treatment should be commenced.

For further management, refer to UHDB clinical guidelines:

Adult: [opac-retrieve-file.pl \(koha-ptfs.co.uk\)](http://opac-retrieve-file.pl(koha-ptfs.co.uk))

Paediatric: [opac-retrieve-file.pl \(koha-ptfs.co.uk\)](http://opac-retrieve-file.pl(koha-ptfs.co.uk))

10. Anaesthetic Emergencies

10.1 Drug Overdose and Toxicity

Drug toxicity and overdose should be considered in all cases of collapse. Substance misuse should be remembered as a potential cause of collapse especially outside of hospital.

Many drug overdoses have specific treatments specific to the drug in question and appropriate help should be sought in the management of such cases, including liaising with Toxbase and speaking to GP/local pharmacist.

The commonly used drugs in obstetric practice which may cause drug toxicity are:

- Magnesium sulphate in the presence of renal impairment
- Local anaesthetic agents

10.2 Magnesium Sulphate Overdose

Signs and symptoms of magnesium sulphate overdose:

- loss of tendon reflexes
- drowsiness
- respiratory depression
- paralysis
- cardiac arrest

Management:

- If magnesium sulphate overdose is suspected, stop infusion immediately.
- The antidote to magnesium toxicity is 10ml 10% calcium gluconate, or 10ml 10% calcium chloride given by slow intravenous injection.

10.3 Local Anaesthetic Toxicity

Toxic effects associated with local anaesthetics usually result from excessively high plasma concentrations. This can be either as a result in inadvertent intravenous injection, or systemic absorption of toxic amounts administered via appropriate (epidural, local infiltration etc.) routes.

A high index of suspicion is needed of maternal collapse following spinal anaesthesia or epidural top-up.

The initial signs and symptoms include a feeling of inebriation and light-headedness followed by confusion, sedation, paraesthesia around the mouth, tinnitus and twitching.

Signs and symptoms of **severe** local anaesthetic toxicity:

- CNS: sudden loss of consciousness with or without tonic-clonic seizures.
- CVS: cardiovascular collapse, sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias.

Management (see Appendix F):

- If local anaesthetic toxicity is suspected, stop injecting immediately.
- Lipid rescue should be used in cases of collapse secondary to local anaesthetic toxicity. Intralipid 20% should be available in all hospitals offering maternity services.
- Manage arrhythmias as usual, recognising that they may be refractory to treatment.
- All cases of lipid rescue should be reported to NHS improvement and the lipid rescue site.

For further management of local anaesthetic toxicity, see Management of Epidural in Labour - Full Guideline:

RDH: [opac-retrieve-file.pl \(koha-ptfs.co.uk\)](https://koha-ptfs.co.uk/opac-retrieve-file.pl)

QHB: [Burton Hospitals NHS Foundation Trust \(koha-ptfs.co.uk\)](https://koha-ptfs.co.uk/Burton%20Hospitals%20NHS%20Foundation%20Trust)=

10.4 **Complications of Epidural Anaesthesia**

For management of Inadvertent spinal injection, see Management of Epidural in Labour - Full Guideline:

RDH: [opac-retrieve-file.pl \(koha-ptfs.co.uk\)](https://koha-ptfs.co.uk/opac-retrieve-file.pl)

QHB: [Burton Hospitals NHS Foundation Trust \(koha-ptfs.co.uk\)](https://koha-ptfs.co.uk/Burton%20Hospitals%20NHS%20Foundation%20Trust)

For management of accidental dural puncture, see Accidental Dural Tap and Post Dural Puncture Headache - Full Clinical Guideline [opac-retrieve-file.pl \(koha-ptfs.co.uk\)](https://koha-ptfs.co.uk/opac-retrieve-file.pl).

11. **Monitoring Compliance and Effectiveness**

As per agreed business unit audit forward programme

12. **References**

Association of Anaesthetists (2019) *Quick Reference Handbook* [Quick Reference Handbook \(QRH\) | The Association of Anaesthetists](#)

Resuscitation Council UK (2021) Emergency Treatment of Anaphylaxis [Emergency Treatment of Anaphylaxis May 2021 0.pdf \(resus.org.uk\)](#)

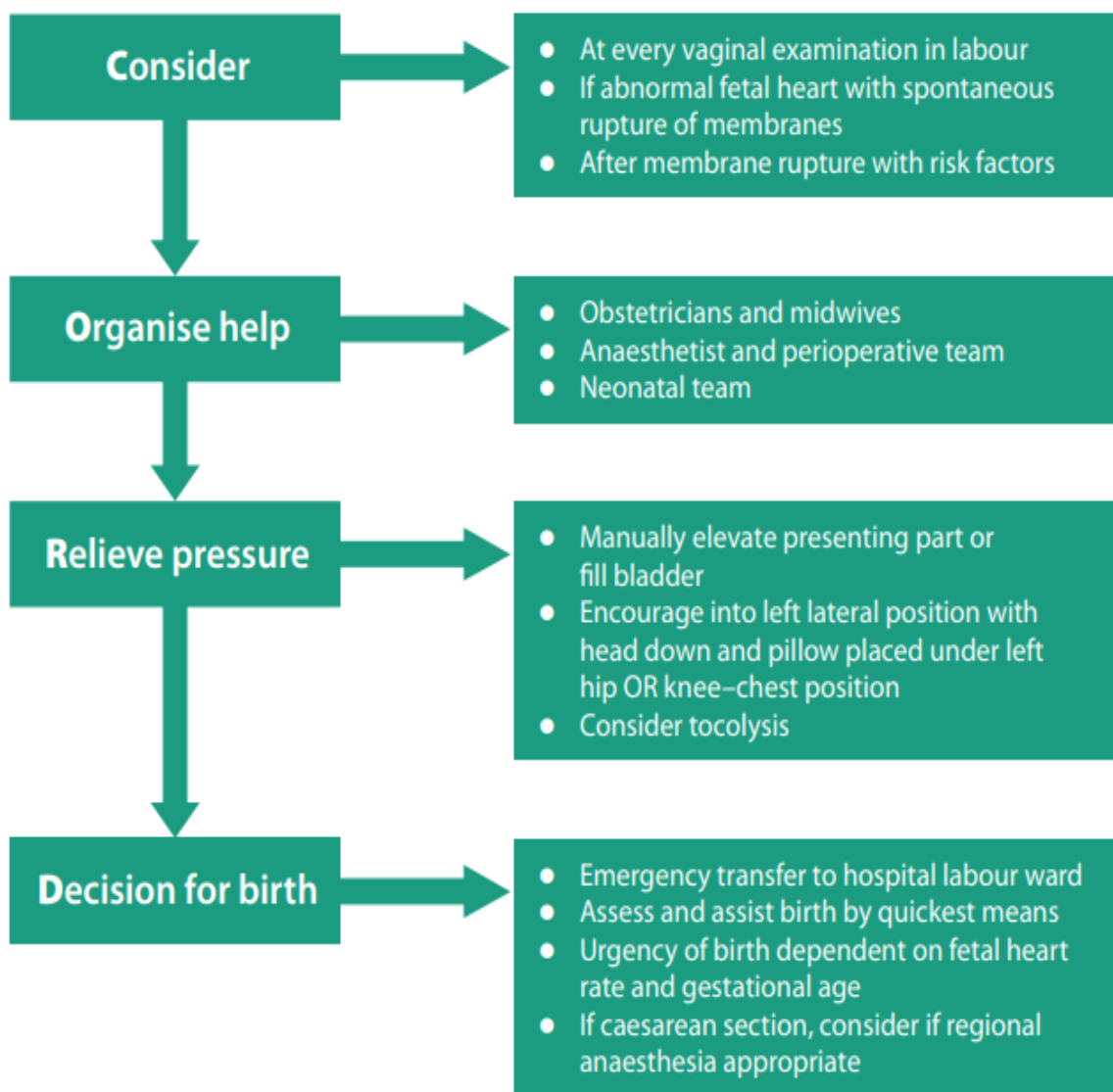
Resuscitation Council UK (2021) *Obstetric Cardiac Arrest* [Maternal Cardiac Arrest QRH OAA V1.1.pdf \(resus.org.uk\)](#)

Royal College of Obstetrics and Gynaecologists (RCOG) (2014) *Umbilical Cord Prolapse - Green-top Guideline No. 50* [Layout Proof \(rcog.org.uk\)](#)

Royal College of Obstetrics and Gynaecologists (RCOG) (2012) *Shoulder Dystocia - Green-top Guideline No. 42* [Layout 1 \(rcog.org.uk\)](#)

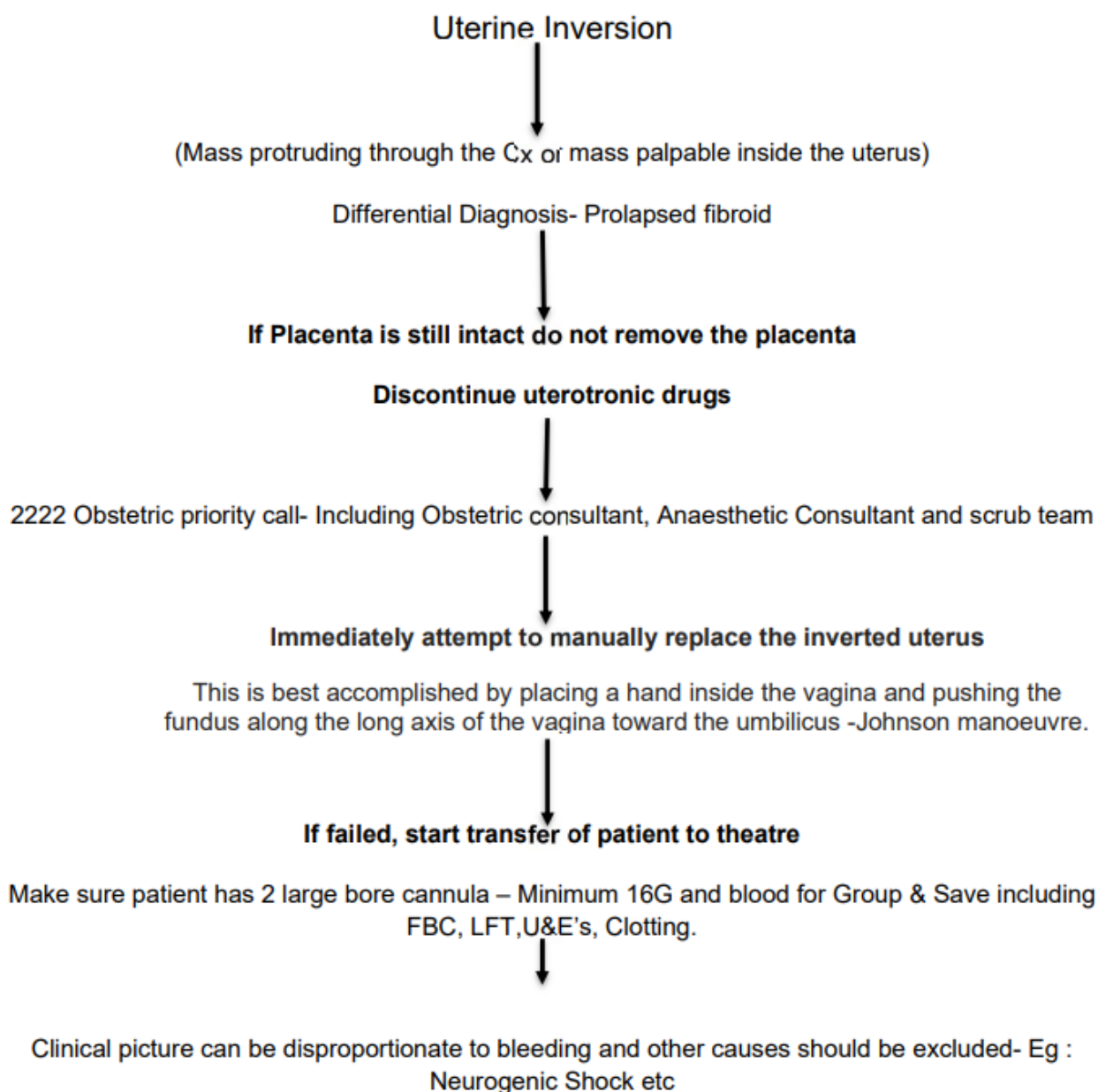
Royal College of Obstetrics and Gynaecologists (RCOG) (2019) *Maternal Collapse in Pregnancy and the Puerperium - Green-top Guideline No. 56* [Maternal Collapse in Pregnancy and the Puerperium \(wiley.com\)](#)

CORD⁴⁸

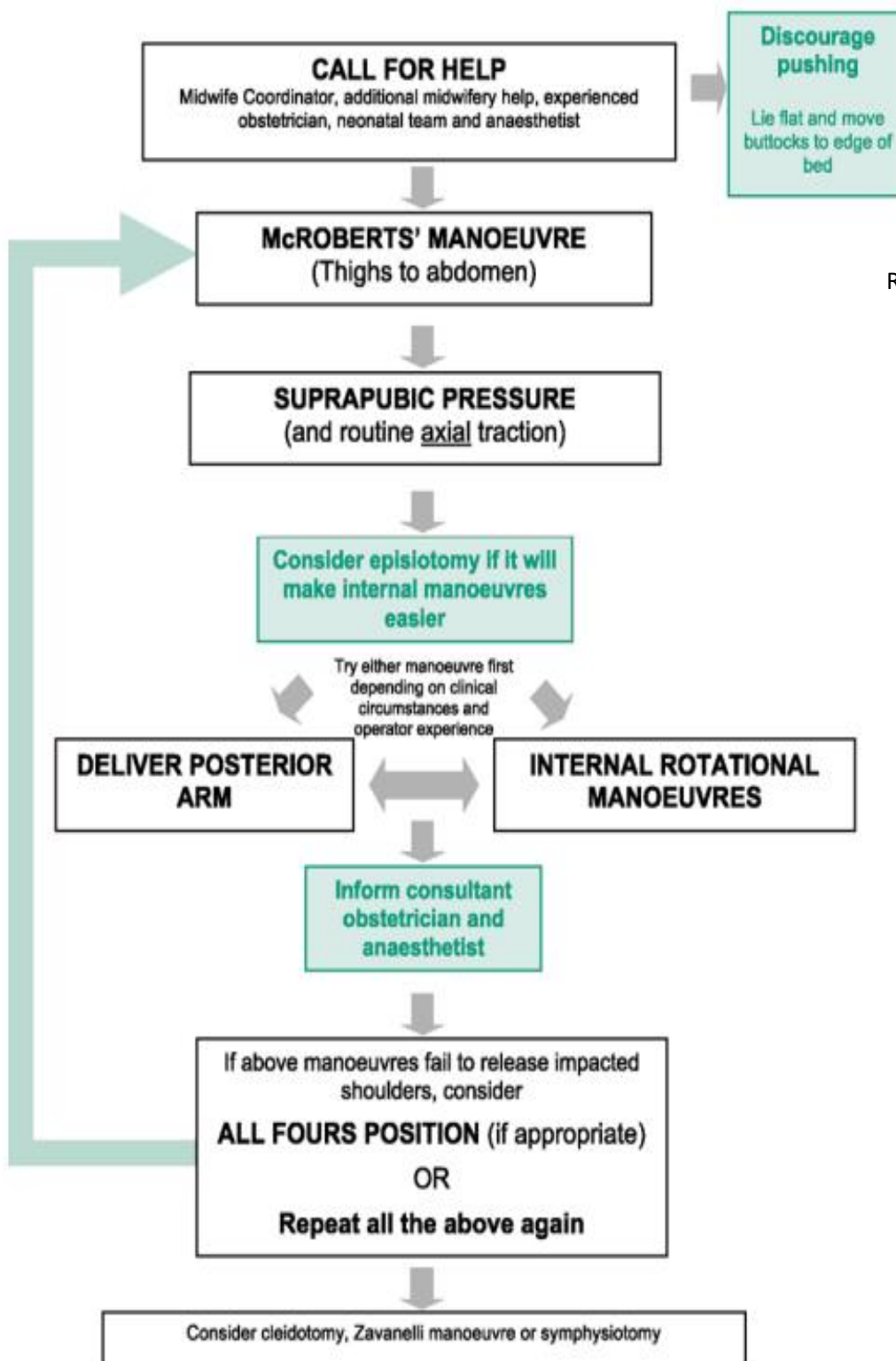


RCOG, 2014

Uterine Inversion Management flow chart



Algorithm for the management of Shoulder Dystocia



RCOG, 2012

Baby to be reviewed by neonatologist after birth and referred for Consultant Neonatal review if any concerns

DOCUMENT ALL ACTIONS ON PROFORMA AND COMPLETE CLINICAL INCIDENT REPORTING FORM.

Obstetric Cardiac Arrest



Resuscitation
Council 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 $15-30^\circ$ 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 \rightarrow defibrillation and first adrenaline and amiodarone after 3rd shock
 - ▶ If PEA / asystole \rightarrow 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 tamponade / sutures, aortic compression, hysterectomy

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

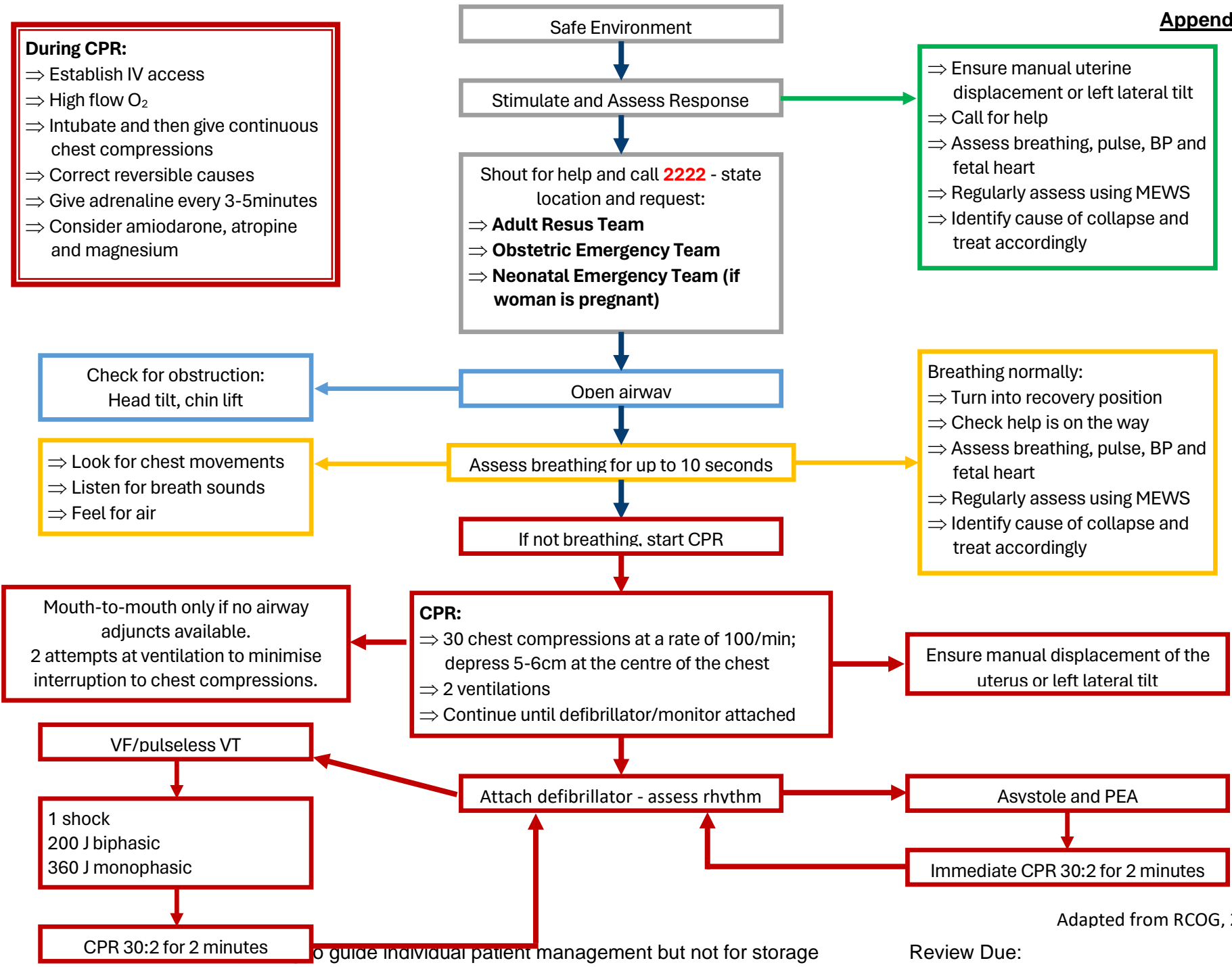
Box B: IV DRUGS FOR USE DURING CARDIAC ARREST

Fluids	500 mL IV crystalloid bolus
Adrenaline	1 mg IV every 3-5 minutes in non-shockable or after 3 rd shock
Amiodarone	300 mg IV after 3 rd 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



to guide individual patient management but not for storage

Adapted from RCOG, 2019

Review Due:

3-10 Local anaesthetic toxicity v.2

Signs of severe toxicity:

- Sudden alteration in mental status, severe agitation or loss of consciousness, with or without tonic-clonic convulsions.
- Cardiovascular collapse: sinus bradycardia, conduction blocks, asystole and ventricular tachyarrhythmias may all occur.
- Local anaesthetic toxicity may occur some time after an initial injection.

START

- 1 Stop injecting the local anaesthetic (remember infusion pumps).
- 2 Call for help and inform immediate clinical team of problem.
- 3 Call for cardiac arrest trolley and lipid rescue pack.
- 4 Give 100% oxygen and ensure adequate lung ventilation:
 - Maintain the airway and if necessary secure it with a tracheal tube.
 - Avoid hypercarbia – consider mild hyperventilation.
- 5 Confirm or establish intravenous access.
- 6 **If circulatory arrest:**
 - Start continuous CPR using standard protocols (→ 2-1) **but:**
 - **Give** intravenous lipid emulsion (Box A).
 - **Use smaller adrenaline dose** ($\leq 1\mu\text{g.kg}^{-1}$ instead of 1 mg)
 - Avoid vasopressin.
 - Recovery may take >1 hour.
 - Consider the use of cardiopulmonary bypass if available.

If no circulatory arrest:

 - Conventional therapies to treat hypotension, brady- and tachyarrhythmia.
 - **Consider** intravenous lipid emulsion (Box A).
- 7 Control seizures:
 - Small incremental dose of benzodiazepine is drug of choice.
 - Thiopental or propofol can be used, but beware negative inotropic effect.
 - Consider neuromuscular blockade if seizures cannot be controlled.

Box A: LIPID EMULSION REGIME

USE 20% Intralipid® (propofol is not a suitable substitute)

Immediately

- Give an initial i.v. bolus of lipid emulsion 1.5 ml.kg^{-1} over 2-3 min (~100 ml for a 70 kg adult)
- Start an i.v. infusion of lipid emulsion at $15\text{ ml.kg}^{-1}.\text{h}^{-1}$ (17.5 ml.min^{-1} for a 70 kg adult)

At 5 and 10 minutes:

- Give a repeat bolus (same dose) if:
 - cardiovascular stability has not been restored or
 - an adequate circulation deteriorates

At any time after 5 minutes:

- Double the rate to $30\text{ ml.kg}^{-1}.\text{h}^{-1}$ if:
 - cardiovascular stability has not been restored or
 - an adequate circulation deteriorates

Do not exceed maximum cumulative dose 12 ml.kg^{-1} (70 kg: 840 ml)

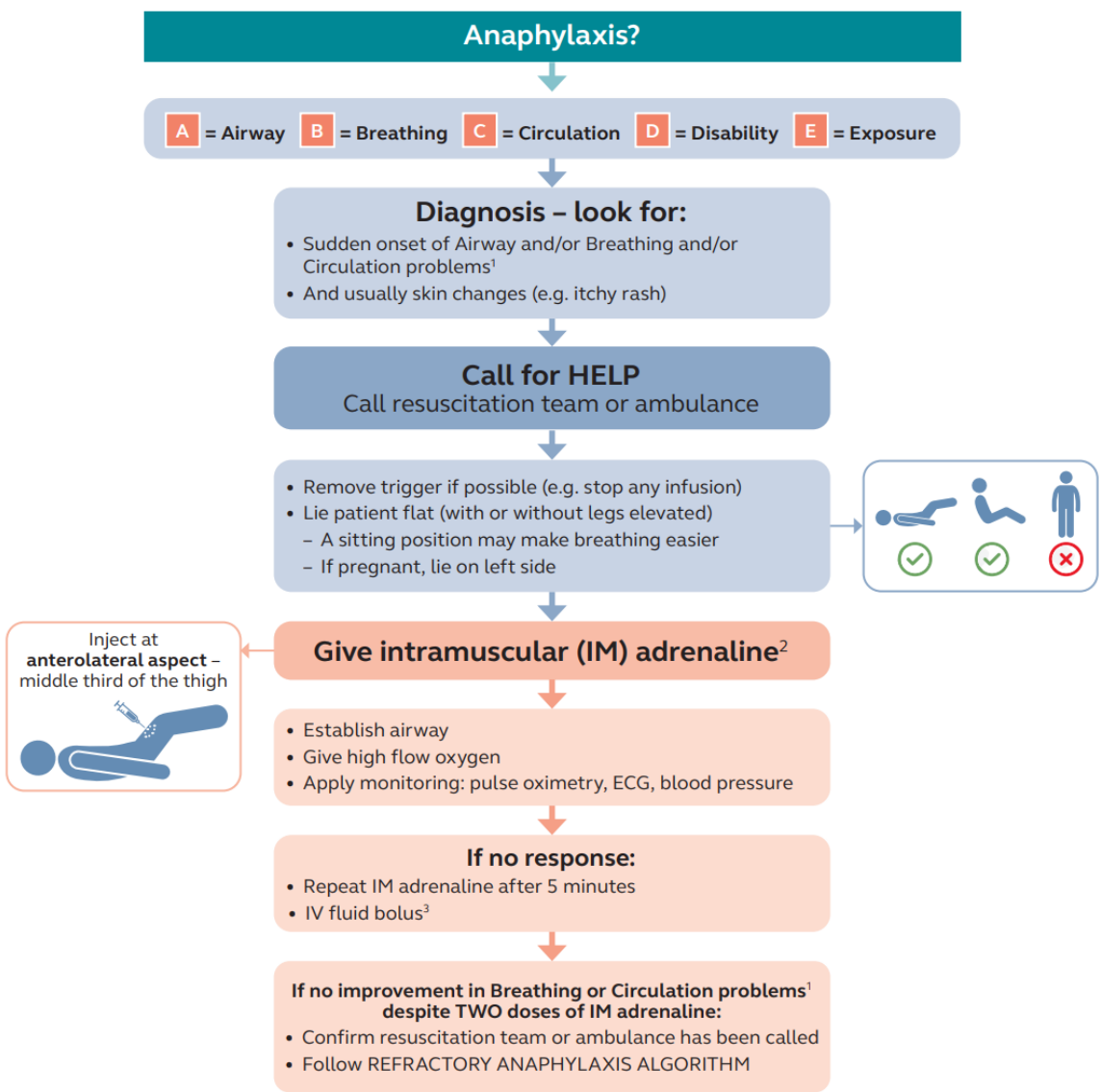
Box B: CRITICAL CHANGES

Cardiac arrest → Check already done 1 to 5, then → 6

Box C: AFTER THE EVENT

Arrange safe transfer to appropriate clinical area
 Exclude pancreatitis: regular clinical review, daily amylase or lipase
 Report case on your local critical incident system and to the relevant national system (these vary between each devolved nation and in Ireland)

Anaphylaxis



1. Life-threatening problems

- Airway**
Hoarse voice, stridor
- Breathing**
↑work of breathing, wheeze, fatigue, cyanosis, SpO₂ <94%
- Circulation**
Low blood pressure, signs of shock, confusion, reduced consciousness

2. Intramuscular (IM) adrenaline

- Use adrenaline at 1 mg/mL (1:1000) concentration
- Adult and child >12 years:** 500 micrograms IM (0.5 mL)
Child 6–12 years: 300 micrograms IM (0.3 mL)
Child 6 months to 6 years: 150 micrograms IM (0.15 mL)
Child <6 months: 100–150 micrograms IM (0.1–0.15 mL)
- The above doses are for IM injection **only**.
 Intravenous adrenaline for anaphylaxis to be given **only by experienced specialists** in an appropriate setting.

3. IV fluid challenge

- Use crystalloid
- Adults:** 500–1000 mL
Children: 10 mL/kg

Documentation Control

Reference Number: UHDB/Obs/03:24/O1	Version: UHDB Version 2	Status: FINAL	
Royal Derby prior to merged document:			
Incorporated guidelines	Date	Author	Reason for update
Cord Prolapse – V5 UHDB document	Nov 2019	Sarah Smith – Clinical Educator	Review
Maternal Collapse – UHDB V1	June 2020	Cindy Meijer – Risk Support Midwife	Review / update
Shoulder Dystocia – V5	July 2018	Miss S Raouf – Consultant Obstetrician	Review
Acute Uterine Inversion – V3	March 2016	Miss S Raouf – Consultant Obstetrician	Review
Burton Trust prior to merged document:			
Shoulder Dystocia	Sept 2017	Obstetric Lead, LW Midwife Skills Drills Trainer	Review
Version control for UHDB merged document:			
UHDB/Obs/02:21/O1	Jan 2021	Miss S Rajendran – Consultant Obstetrician	Incorporation of guidelines for PrOMPT
UHDB V2	Feb 2024	Miss S Bazmi - O&G Consultant Jo Bland - Consultant Anaesthetist	Review
Intended Recipients:			
Training and Dissemination: Cascaded electronically through lead sisters/midwives/doctors via NHS.net, Published on Intranet, Article in Business unit newsletter;			
To be read in conjunction with: obstetric infections - antibiotic guideline			
Keywords:			
Consultation with:	Obstetric & Midwifery Staff		
Business Unit sign off:	/ /2024: Maternity Guidelines Group: Miss A Joshi – Chair / /2024: Maternity Governance Group / CD - Mr R Deveraj Emergency ratification 05/04/2024		
Notification Overview sent to TIER 3 Divisional Quality Governance Operations & Performance: / /2024			
Implementation date:	05/04/2024		
Review Date:	April 2027		
Key Contact:	Joanna Harrison- Engwell		