Amniotic Fluid Embolus

Classification :	Guideline
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Departments/Group this Document applies to:	Maternity

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Guideline to be followed by (target staff): This guideline aims to provide a standardized process for a safe and appropriate management of Amniotic Fluid Embolism.

To be read in conjunction with the following documents:
Trust Policy for the Management of Cardiorespiratory Arrest
Debriefing Guideline

Are there any eCARE implications? No

CQC Fundamental standards:
Regulation 9 – person centred care
Regulation 10 – dignity and respect
Regulation 11 – Need for consent
Regulation 12 – Safe care and treatment
Regulation 13 – Safeguarding service users from abuse and improper treatment
Regulation 14 – Meeting nutritional and hydration needs
Regulation 15 – Premises and equipment
Regulation 16 – Receiving and acting on complaints
Regulation 17 – Good governance
Regulation 18 – Staffing
Regulation 19 – Fit and proper

Disclaimer

Since every patient's history is different, and even the most exhaustive sources of information cannot cover every possible eventuality, you should be aware that all information is provided in this document on the basis that the healthcare professionals responsible for patient care will retain full and sole

responsibility for decisions relating to patient care; the document is intended to supplement, not substitute for, the expertise and judgment of physicians, pharmacists or other healthcare professionals and should not be taken as an indication of suitability of a particular treatment for a particular individual.
The ultimate responsibility for the use of the guideline, dosage of drugs and correct following of instructions as well as the interpretation of the published material **lies solely with you** as the medical practitioner.

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Guideline Statement

This document provides support for all practitioners within the maternity unit in recognizing early symptoms of amniotic fluid embolus (AFE) and provides guidance for early action and treatment to improve maternal and fetal outcomes.

The objectives of this document are to ensure all staff knows how to recognize and safely manage the care of women experiencing an amniotic fluid embolus using evidence-based research.

Executive Summary

- Amniotic fluid embolism (AFE) is a rare (1 in 50,000 pregnancies) obstetric emergency that can present as a sudden and unexpected maternal collapse associated with hypotension, hypoxia, disseminated intravascular coagulation (DIC).
- Mortality is wide-ranging and was thought to be up 65%, however with increased awareness and immediacy of resuscitation, it is likely to have a mortality rate of around 20%(MBBRACE).
- There is no specific treatment for amniotic fluid embolism, and initial emergency management is the same as for any other cause of sudden maternal collapse - with cardiovascular and respiratory resuscitation and correction of the coagulopathy.
- High quality supportive care can result in improved outcomes for both mother and baby in amniotic fluid embolism (AFE)
- Paramount is early involvement of senior experienced staff, including obstetricians, anaesthetists, haematologists and intensivists.
- Coagulopathy needs early, aggressive treatment, guided by haematologists.

1.0 Roles and Responsibilities:

Obstetricians – decision making, prescribing, operative

Midwives – decision making, pre-operative and post-operative care, care of the neonate

Anaethetists – anaesthesia, resuscitation

Nurses – pre and post-operative care

Maternity care assistants – pre and post-operative care

Pediatricians – care of the neonate

ENSURE THAT DATIX IS FILLED TO ENABLE REPORTING TO UKOSS TEAM

2.0 Implementation and dissemination of document

This guideline is available on the Trust intranet and has followed the full guideline review process prior to publication.

3.0 Processes and procedures

3.1 Definition and incidence

Amniotic fluid embolus is rare. UK data reported over 4 years to UKOSS estimates incidence of amniotic fluid embolism as 2 cases per 100 000 maternities (UKOSS 2010). The most recent MBRRACE-UK report showed the mortality rate per 100,000 pregnancies was 0.33 for 2016-18 (from 0.26 in the previous report for 2015-17). (Knight et al, 2020). Mortality rates from amniotic fluid embolism have remained essentially unchanged between 2009 and 2018 and are extremely low, but it is the fourth commonest cause of direct maternal mortality. (Knight et al, 2020, pp.9-10). Of the 20% of women who survive, there is a 7% chance of permanent neurological impairment.

The condition is thought to occur when amniotic fluid enters the maternal circulation; this is suggested to cause a massive anaphylactic reaction, with severe cardio-respiratory failure together with activation of platelets and consumption of the coagulation cascade. For those women who die, most are within 12 hours of presentation.

The classical scenario of amniotic fluid embolism involves an older multiparous woman in advanced labour who suddenly collapses, although it can occur following termination of pregnancy, amniocentesis, placental abruption and trauma, during caesarean section and unexpectedly up to 30 minutes after delivery.

Management is supportive (oxygenation, inotropic cardiovascular support, blood transfusion and replacement of clotting factors). Maternal outcome is improved if the woman has rapid access to an intensive care unit.

Risk factors include:

- Maternal age
- Polyhydramnios
- Post artificial rupture of membranes
- Operative delivery
- Uterine rupture
- Placental abruption

3.2 Presentation

Consider AFE in a labouring or recently delivered woman with no previously known cause for acute onset of symptoms as below:

- Acute hypotension / cardiac arrest
- Acute hypoxia
- Coagulopathy followed by haemorrhage (seen 65%)

Other symptoms may be present, which can occur prior to or with maternal collapse

- A sudden change in the woman's behaviour, restlessness or agitation (may be an early feature of hypoxia) (50%)
- Acute respiratory distress (60%)
- Tonic-clonus seizures may occur (20%)

There may be acute fetal distress as seen with CTG (cardiotocographic) abnormalities prior to maternal collapse, uterine hypertonus and placenta abruption leading to massive haemorrhage.

Progression usually occurs in two phases.
In phase 1, bronchospasm with pulmonary hypertension and elevated right ventricular pressure causing hypoxia. Hypoxia causes myocardial capillary damage and pulmonary capillary damage, left heart failure, and acute respiratory distress syndrome.

Women who survive phase 1 may enter phase 2. This is a hemorrhagic phase characterized by massive haemorrhage with uterine atony and DIC; however, fatal consumptive coagulopathy may be the initial presentation.

3.3 Differential diagnosis

Many conditions can as maternal collapse and clinicians must consider the whole clinical picture.
Potential cause of maternal collapse:

- Massive obstetric haemorrhage
- Placental abruption
- Uterine rupture
- Septic shock
- Eclampsia
- Air embolus
- Acute myocardial infarction
- Peripartum cardiomyopathy
- Anaphylaxis
- Transfusion reaction
- Local anaesthetic toxicity

3.4 Management of suspected AFE

3.4.1 Summon help

- Phone 2222 for an obstetric emergency call AND a neonatal emergency call
- A 2222 maternal cardiac arrest call should be initiated if mother is in cardiac arrest.

- Consultant obstetrician and Consultant obstetric anaesthetist ask to attend immediately.
- Liaise with haematology regarding the need for blood and blood products as appropriate. The consultant haematologist can be contacted via switchboard for advice.
- In the community setting, basic life support should be administered and rapid transfer to the nearest hospital with ED facilities arranged.
- Support and care of partner and family should not be forgotten.
- An experienced member of staff should be allocated the role of scribe.

3.4.2 Acute Management

Early resuscitation is vital:

- The management of AFE is supportive, as there is no proven effective therapy (RCOG, 2019)
- Maternal resuscitation should follow the Resuscitation Council (UK) guidelines using the standard A, B, C approach with some modification for a pregnant woman in particular relief of aortocaval compression. Aortocaval compression significantly reduces cardiac output from 20 weeks of gestation onwards and the efficacy of chest compressions during resuscitation.

The following is reproduced from the MOET algorithm 2020.

3.4.2.1 Airway / Breathing

- Assess airway/ breathing and maintain airway patency
- High flow oxygen with tight fitting mask
- Bag and mask ventilation should be undertaken until intubation can be achieved
- Consider early intubation with a cuffed endotracheal tube using cricoid pressure to minimize the risk of aspiration.

3.4.2.2 Circulation

- Check for signs of life (pulse and blood pressure)
- If in doubt, start chest compressions at a rate of 30:2 chest compressions : 2 ventilations (please refer to the Trust Policy for the Management of Cardiorespiratory Arrest).

    - Use manual displacement of uterus to reduce aorto-caval compression or left tilt.
    - Early consideration of peri-mortem Caesarean section with 5 minutes of loss of circulation to aid maternal resuscitation.
    - The same defibrillation energy levels should be used as in the non-pregnant patient.

- Two wide-bore cannulae (minimum 16 gauge) 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.
- Take blood for full blood count, U &E's, LFT's, Coagulation, X Match 4 units of blood

- DIC with massive haemorrhage (often secondary to uterine atony) develops rapidly after an amniotic fluid embolus. A fall in platelet count, abnormal clotting screen, or clinical feature of DIC (bruising, bleeding from venipuncture sites or skin incisions) must be treated aggressively. Plasma substitutes and treatment must start before results are available and until specific fluids are available.
- There should be an aggressive approach to volume replacement, although caution should be exercised in the context of pre-eclampsia. Strict fluid balance is required. Ongoing care will require invasive central monitoring.
- Women with symptoms suspicious of amniotic fluid embolism should be transferred to ITU as soon as possible, as these women have a better chance of survival.

3.4.3 Peri-mortem Caesarean section

- 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 an 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.
- Resuscitation efforts should be continued until a decision is taken by the Consultant Obstetrician, and Consultant Anaesthetist in consensus with the cardiac arrest team.

3.4.4 Treatment of coagulopathy in AFE

Coagulation factors should be administered promptly after multidisciplinary discussion in accordance with the principles in RCOG Green-top Guideline 52

• If no clotting results are available and bleeding is continuing, give 4 units of red blood cells, then fresh frozen plasma (FFP) should be infused at a dose of 12–15 ml/kg until hemostatic test results are known.
• If prothrombin time/activated partial thromboplastin time is more than 1.5 times normal and hemorrhage is ongoing, volumes of FFP in excess of 15 ml/kg are likely to be needed to correct coagulopathy.

• Clinicians should be aware that these blood components must be ordered as soon as a need for them is anticipated, as there will always be a short delay in supply because of the need for thawing.

Recombinant factor VII should only be used if coagulopathy cannot be corrected by blood component replacement as it has been associated with poorer outcome in women with AFE (RCOG, 2019, pp.34-5)

3.5 Documentation

- Accurate documentation in all cases of maternal collapse, whether or not resuscitation is successful, is essential.
- Where possible ensure an experienced member of staff should be allocated to document time and events. Scribe records must be filed in the maternal records.
- All cases of amniotic fluid embolism / maternal collapse should generate a clinical incident form and the care should be reviewed through the clinical governance process.
- **All cases of amniotic fluid embolism, whether the woman survived or not, should be reported by the identified Trust UKOSS contact to the AFE Register at UKOSS.**

3.6 Debriefing

Debriefing is recommended for the woman, her family and the staff involved in the event (please refer to the Debriefing guideline).

3.7 Training

- All maternity staff should have annual formal multidisciplinary training in life support and the adaptations needed in the management of maternal collapse.
- Small group multidisciplinary interactive practical training is recommended to improve the management of maternal collapse.
- All front-line staff must be aware of the adaptations for CPR in pregnancy. This includes paramedics who will deal with collapse in the community setting and accident and emergency department personnel, as well as staff within a maternity unit.
- In particular, drills should practice the principle of a senior clinician taking the 'helicopter view' role to provide the necessary overview of women's management

3.8 Useful links

Link to maternal collapse in pregnancy algorithm
https://obgyn.onlinelibrary.wiley.com/cms/asset/0dce504e-2086-4d45-ad69-79cc0d4ba4b2/bjo15995-fig-0003-m.jpg

- In such situations, staff should always be aware of, and follow national guidance on the use of personal protective equipment (PPE). Guidance for the COVID-19 pandemic can be found at https://www.resus.org.uk/covid-19-resources.

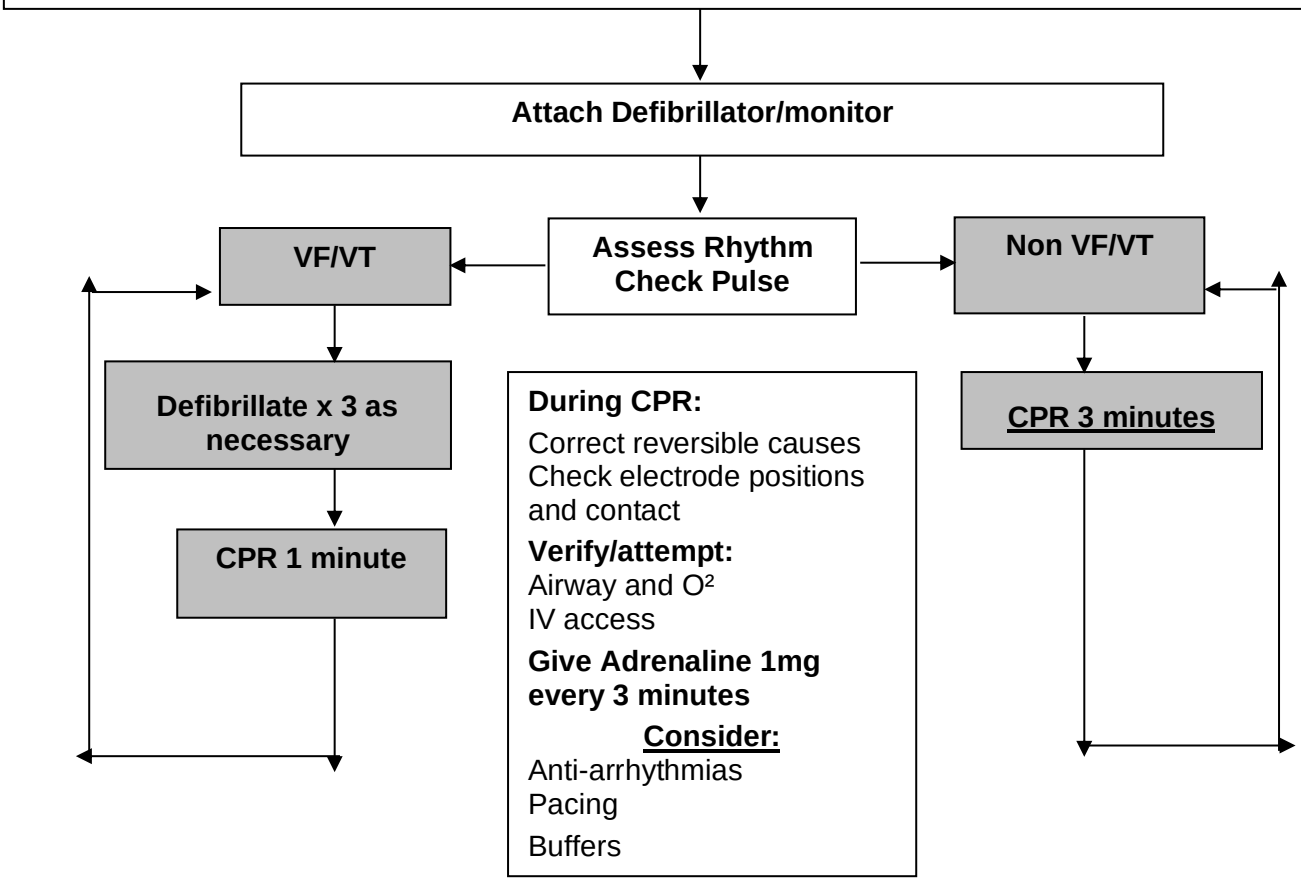
- UK Obstetric Surveillance System (UKOSS) [https://www.npeu.ox.ac.uk/ukoss].
- MBRRACE-UK: Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK [https://www.npeu.ox.ac.uk/mbrrace-uk].
- Advance Life Support in Obstetrics (ALSO) [http://www.also-uk.com/].
- Practical Obstetric Multi-Professional Training (PROMPT) [http://www.promptmaternity.org/].
- Managing Medical and Obstetric Emergencies and Trauma (mMOET), Advanced Life Support Group (ALSG) [http://www.alsg.org/home/].
- The Birth Trauma Association [http://www.birthtraumaassociation.org.uk/].

3.9 Obstetric Emergency

Basic Life Support Guidelines

Basic Life Support

1. **Check responsiveness**
2. **Place patient on firm surface with manual displacement of the uterus**
3. **Open airway. Check breathing.**
4. **If not breathing, apply cricoid pressure and give 2 effective breaths. Cricoid pressure should be maintained until the airway is secured by oro-tracheal intubation.**
5. **Commence CPR according to current ERC Guidelines**



Potentially Reversible Causes:

Hypoxia
Hypovolaemia
Hyper/hypokalaemia/metabolic disorders
Hypothermia
Tension Pneumothorax
Tamponade
Toxic/Therapeutic disorders
Thrombo-embolic and mechanical obstruction

3.10 Cardiopulmonary Resuscitation in Pregnancy

General Considerations:

- Call for help early (obstetric emergency, cardiac arrest and neonatal emergency).
- Start basic life support according to standard guidelines.
- Use the standard hand position for chest compressions on the lower half of the sternum
- If over 20 weeks pregnant or the uterus is palpable above the level of the umbilicus:
    - Manually displace the uterus to the left to remove aortocaval compression.
    - If feasible, add left lateral tilt – the chest should remain on supported on a firm surface (e.g., in the operating room). Aim for a tilt between 15 and 30 degrees. Even a small amount of tilt may be better than no tilt. The angle of tilt used needs to enable high-quality chest compressions and if needed allow surgical delivery of the fetus.
- Prepare early for emergency hysterotomy.
- If over 20 weeks pregnant or the uterus is palpable above the level of the umbilicus and immediate (within 4 minutes) resuscitation is unsuccessful, deliver the fetus by emergency hysterotomy aiming for delivery within 5 minutes of collapse.
- Place defibrillator pads in the standard position as far as possible and use standard shock energies.
- Consider early tracheal intubation by a skilled operator.
- Identify and treat reversible causes (e.g., haemorrhage). Focused ultrasound by a skilled operator can be used to identify reversible causes and may also be used to assess if a fetal heart rate is present.
- Consider extracorporeal CPR (ECPR) as a rescue therapy if ALS measures are failing.

3.11 Rationale for main recommendations

These recommendations are made in response Maternal Collapse in Pregnancy and the Puerperium (Green-top Guideline No. 56 and MBRRACE-UK: Saving Lives, Improving Mothers' Care 2020: Lessons to inform maternity care from the UK and Ireland Confidential Enquiries in Maternal Death and Morbidity 2016-18.

4.0 Statement of evidence/references

Knight, M., et al. (eds) on behalf of MBRRACE-UK (2020) *Saving lives, improving mothers' care - lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2016-18*. [Online]. Available from: https://www.npeu.ox.ac.uk/assets/downloads/mbrrace-uk/reports/maternal-report-2020/MBRRACE-UK_Maternal_Report_Dec_2020_v10.pdf [Accessed 26 January 2021]
See Chapter 7 on 'Lessons for care of women with haemorrhage or amniotic fluid embolism'

Managing Obstetric Emergencies and Trauma Course Handbook. 2020 3rd Edition.

Resuscitation Council UK (2015) *2015 resuscitation guidelines*. [Online]. Available from: https://www.resus.org.uk/library/2015-resuscitation-guidelines [Accessed 26 January 2021]

Resuscitation Council UK (2015) *The ABCDE approach.* [Online]. Available from: https://www.resus.org.uk/library/2015-resuscitation-guidelines/abcde-approach [Accessed 26 January 2021]

Royal College of Obstetricians & Gynaecologists (2019) *Maternal collapse in pregnancy and the puerperium*. Green-top Guideline No. 56. 2nd ed. [Online]. Available from: https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg56/

5.0 Governance

5.1 Document review history

Version number	Review date	Reviewed by	Changes made
7	06/2021	A Ram Mohan, A Johansen-Bibby, N Gupta.	Updated in line with latest practice

5.2 Consultation History

Stakeholders Name/Board	Area of Expertise	Date Sent	Date Received	Comments	Endorsed Yes/No
Women's health digital review group	Maternity	25/05/2021	08/06/2021	Yes	Yes
Guideline meeting	Maternity	25/06/2021		Approved	
Women's Health Clinical Improvement Group (CIG)	Maternity	07/07/2021		Approved	

5.3 Audit and monitoring

Audit/Monitoring Criteria	Tool	Audit Lead	Frequency of Audit	Responsible Committee/Board
a) Percentage of women with suspected or confirmed AFE b) Risk management IR1 system c) All cases of suspected or proven amniotic fluid embolism, be they fatal or	Audit and statistics	Obstetricians and midwives	Annually	Risk group/labour ward forum

not, should be reported to the UKOSS Team d) Monitor training of attendance at the minimum requirement for BLS all staff				

5.4 Equality Impact Assessment

As part of its development, this Guideline and its impact on equality has been reviewed. The purpose of the assessment is to minimise and if possible remove any disproportionate impact on the grounds of race, gender, disability, age, sexual orientation, religion or belief, pregnancy and maternity, gender reassignment or marriage and civil partnership. No detriment was identified. Equality Impact assessments will show any future actions required to overcome any identified barriers or discriminatory practice.

Equality Impact Assessment			
Division	Women and children	Department	Maternity
Person completing the EqIA	Erica Puri	Contact No.	87153
Others involved:		Date of assessment:	31/07/2021
Existing policy/service	Yes	New policy/service	No

Will patients, carers, the public or staff be affected by the policy/service?	Yes
If staff, how many/which groups will be affected?	*For example: community midwives, phlebotomists, all staff*

Protected characteristic	Any impact?	Comments
Age	NO	Positive impact as the policy aims to recognise diversity, promote inclusion and fair treatment for patients and staff
Disability	NO	
Gender reassignment	NO	
Marriage and civil partnership	NO	
Pregnancy and maternity	NO	
Race	NO	
Religion or belief	NO	
Sex	NO	
Sexual orientation	NO	

What consultation method(s) have you carried out?
Meetings and emails
How are the changes/amendments to the policies/services communicated?

Email and meetings			
What future actions need to be taken to overcome any barriers or discrimination?			
What?	Who will lead this?	Date of completion	Resources needed
Review date of EqIA	25/06/2021		