Guideline for the management of maternal collapse

Author/Owner	Obstetric lead consultant, Birth Centre lead Consultant/ Guideline group	
Equality Impact Assessment	N/A if clinical guideline or procedure	Date:
Version	4	
Status	Final Approved	
Publication date	16/04/24	
Review date	27/03/2027	
Approval recommended by	Women's Business and Governance Meeting	Date: 15/03/2024
Approved by	CBU 3 Overarching Governance Meeting	Date: 27/03/2024
Distribution	Barnsley Hospital NHS Foundation Trust – intranet Please note that the intranet version of this document is the only version that is maintained. Any printed copies must therefore be viewed as "uncontrolled" and as such, may not necessarily contain the latest updates and amendments	

Table of Contents

1.0 Introduction

Maternal collapse is a rare but life-threatening event with a wide range of underlying causes. The outcome for the mother and the fetus is dependent upon effective resuscitation and diagnosis of the underlying cause.

If the collapse occurs in pregnancy the fetus will be affected by the maternal compromise. Maternal resuscitation is the primary aim.

The maternal collapse and subsequent care will be managed by a multidisciplinary team.

Maternal collapse is an acute event in the woman involving the cardiorespiratory systems and/or the brain, resulting in a reduced or absent level of consciousness (and potential death) at any stage in pregnancy and up to six weeks after delivery.

2.0 Objective

To discuss the identification of those women at an increased risk of maternal collapse and lay out the most appropriate initial and ongoing management procedures to ensure optimum maternal and neonatal outcomes are achieved.

3.0 Scope

All members of the clinical multidisciplinary team involved in the provision of maternity/obstetric care should be aware of the contents of this document and be able to implement it within their professional scope of practice.

4.0 Main body of the document

4.1 Causes of maternal collapse

There are many causes of maternal collapse and these may or may not be pregnancy related. A systemic review of the woman to determine the underlying cause is essential in conjunction with effective resuscitation.

Causes of maternal collapse	
Acute coronary syndrome Ischaemic heart disease Hypovolaemia Hypoxia Hyperkalaemia, hypokalaemia, Hypocalcaemia, acidaemia and other metabolic disorders Hypothermia Pre- eclampsia Eclampsia	Vasovagal attacks Epileptic seizures Thrombosis (coronary or pulmonary) Tension pneumothorax Tamponade (cardiac) Toxins Sepsis Anaphylaxis Intra-cranial haemorrhage

4.1.1 Physiological changes in pregnancy which will impact upon management

Aortocaval compression

From twenty weeks gestation, if the woman is in a supine position compression of the vena cava and the aorta by the gravid uterus will reduce cardiac output by 30-40% (supine hypotension). In cases of cardiac arrest, chest compressions will only be 10% as effective as when used in a non-pregnant woman.

Respiratory changes

Changes in lung function, diaphragmatic splinting and increased oxygen consumption cause the pregnant woman to become hypoxic more readily and make ventilation more difficult. Weight gain, increased breast size and laryngeal oedema can make intubation difficult.

Aspiration

The effect of progesterone on the lower oesophageal sphincter along with delayed gastric emptying and increased intra-abdominal pressure increases the risk of regurgitation and aspiration pneumonitis (Mendelson's syndrome).

Circulation

Increased cardiac output and a hyperdynamic circulation mean that pregnant women can rapidly lose large volumes of blood especially from the uterus which receives 10% of the cardiac output at term. A healthy pregnant woman can compensate and may lose up to 35% of her total blood volume before becoming symptomatic.

4.2 Management of a maternal collapse

Use of a Modified Obstetric Early Warning Score (MOEWS) chart should be in place for all women requiring observation though occasionally maternal collapse may occur without prior warning.

See appendix 2 for Resus Council Arrest management

4.3 Perimortem Caesarean Section

Please note in cases of cardiac arrest in a pregnant woman of more than twenty weeks gestation a Perimortem Caesarean Section should be considered if resuscitation is not successful after four minutes and performed within five minutes.

- Perimortem section should be performed whilst continuing CPR irrespective of where the woman has collapsed (Do not delay by attempting to transfer the woman to theatre.)
- In essence the only equipment needed is a scalpel and umbilical cord clamps but a perimortem section pack is available on the resuscitation trolley
- The obstetrician should use the incision that facilitates the most rapid access (this will be the one they feel most competent to perform)
- A fixed blade scalpel and two umbilical cord clamps should be immediately available on ALL emergency trolleys
- Following delivery, if the resuscitation is successful the woman will be transferred to theatre to complete the operation and for stabilisation
- Assessment and resuscitation of the infant will be managed by the neonatal team
- The ongoing management of the maternal collapse will require close collaboration within the multi-disciplinary team and will be dependent upon the cause of the collapse following the relevant guideline
- The woman will be nursed in the environment most appropriate for her condition i.e. HDU on the Birthing Centre, ICU or a specialist tertiary unit.
- In the unfortunate event of a maternal demise please follow the guideline for the Local Management of a Maternal Death
- Please ensure that the woman's body is left as it was at the time of death and the scene of death is left undisturbed until permission has been sought from the coroner's office (by the consultant) that last offices can be performed
- Any infusions, cannulas, catheters, tubes etc. must be left in situ
- The woman's body or the scene of an incident must not be tidied up and/or altered in any way without formal documented permission from HM Coroner/HM Coroner's Officer and/or South Yorkshire Police.
- Please be aware that the Coroner's officer or equivalent (usually a policeman) may insist on being present when relatives visit the body

5.0 Roles and responsibilities

Midwives/Obstetricians/Anaesthetists

To work as part of a multi-disciplinary team to give effective and immediate evidence-based resuscitation and follow-on care to a collapsed woman.

Paediatricians

To assess and resuscitate the newborn infant as required.

5.1 Documentation

Accurate and contemporary documentation is required from all staff groups involved in care delivery.

6.0 Associated documents and references

Royal College of Obstetricians and Gynaecologists (RCOG). Green-top Guideline No.56. Maternal Collapse in Pregnancy and the Puerperium (17/12/2019). https://obgyn.onlinelibrary.wiley.com/doi/epdf/10.1111/1471-0528.15995

Resuscitation Council UK (2015). Guidelines: In-hospital resuscitation file:///C:/Users/colec/Downloads/Guidelines%20Inhospital%20resuscitation.pdf

7.0 Training and resources

Training will be given as outlined in the Maternity Training Needs Analysis. This is updated on an annual basis.

8.0 Monitoring and audit

Any adverse incidents relating to the management of a maternal collapse will be monitored via the incident reporting system. Any problems will be actioned via the case review and root cause analysis action plans. The action plans are monitored by the governance midwife to ensure that improvements in care are made. The trends and any root cause analysis are discussed at the monthly risk meetings to ensure that appropriate action has been taken to maintain safety.

The guideline for the management of maternal collapse will be audited in line with the annual audit programme, as agreed by the CBU. The audit action plan will be reviewed at the monthly risk management meetings on a quarterly basis and monitored by the risk midwife to ensure that improvements in care are made.

9.0 Equality and Diversity

The Trust is committed to an environment that promotes equality and embraces diversity in its performance as an employer and service provider. It will adhere to legal and performance requirements and will mainstream equality, diversity and inclusion principles through its policies, procedures and processes. This guideline should be implemented with due regard to this commitment.

To ensure that the implementation of this guideline does not have an adverse impact in response to the requirements of the Equality Act 2010 this policy has been screened for relevance during the policy development process and a full equality impact assessment is conducted where necessary prior to consultation. The Trust will take remedial action when necessary to address any unexpected or unwarranted disparities and monitor practice to ensure that this policy is fairly implemented.

This guideline can be made available in alternative formats on request including large print, Braille, moon, audio, and different languages. To arrange this please refer to the Trust translation and interpretation policy in the first instance.

The Trust will endeavour to make reasonable adjustments to accommodate any employee/patient with particular equality, diversity and inclusion requirements in implementing this guideline. This may include accessibility of meeting/appointment venues, providing translation, arranging an interpreter to attend appointments/meetings, extending policy timeframes to enable translation to be undertaken, or assistance with formulating any written statements.

9.1 Recording and Monitoring of Equality & Diversity

This section is mandatory for all Trust Approved Documents and must include the statement below:

The Trust understands the business case for equality, diversity and inclusion and will make sure that this is translated into practice. Accordingly, all guidelines will be monitored to ensure their effectiveness.

Monitoring information will be collated, analysed and published on an annual basis as part of Equality Delivery System. The monitoring will cover the nine protected characteristics and will meet statutory employment duties under the Equality Act 2010. Where adverse impact is identified through the monitoring process the Trust will investigate and take corrective action to mitigate and prevent any negative impact.

Appendix 1 Equality Impact Assessment – required for policy only

Appendix 2 Glossary of terms

MOEWS- Modified Obstetric Early Warning Score

Obstetric Cardiac Arrest

Resuscitation Council UK | MBRRACE-UK | Obstetric Anaesthetists' Association

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

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

ersion 1.1

Appendix 4
Maintain a record of the document history, reviews and key changes made (including versions and dates)

Version	Date	Comments	Author
1	27/01/2021		Maternity guideline group

Review Process Prior to Ratification:

Name of Group/Department/Committee	Date
Women's services business and governance meeting	15/03/2024
CBU 3 Business and Governance meeting	27/03/2024

Please complete the following information and attach to your document when submitting a policy, clinical guideline or procedure for approval.

Document type (policy, clinical guideline or procedure)	Guideline
Document title	**Guideline for the management of maternal collapse**
Document author (Job title and team)	Obstetric lead consultant, Birth Centre lead Consultant/ Guideline group
New or reviewed document	Reviewed
List staff groups/departments consulted with during document development	**Obstetric consultants, resuscitation officer, senior midwives**
Approval recommended by (meeting and dates):	**Women's Services Business & Governance meeting March 2024 CBU 3 Business and Governance meeting**
Date of next review (maximum 3 years)	2026
Key words for search criteria on intranet (max 10 words)	Maternal, collapse, cardiac arrest
Key messages for staff (consider changes from previous versions and any impact on patient safety)	
I confirm that this is the FINAL version of this document	**Name:** **Designation:**

FOR COMPLETION BY THE CLINICAL GOVERNANCE TEAM

Approved by (group/committee): **Date approved:** **Date Clinical Governance Administrator informed of approval:** **Date uploaded to Trust Approved Documents page:**