WOMEN'S HEALTH AND PAEDIATRICS
MATERNITY UNIT

RECOGNISING THE DETERIORATING PREGNANT WOMAN

Amendments			
Date	Page(s)	Comments	Approved by
February 2022		Complete new Guideline To replace maternal collapse Includes MEWS and escalation	Perinatal Guidelines

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Target Audience: Staff working within maternity services

Comments on this document to: Perinatal Guidelines Group

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

Version 1.1

RECOGNISING THE DETERIORATING PREGNANT WOMAN

Early recognition of critical illness and prompt involvement of senior clinical staff and the multi-professional team remain key factors in providing high quality care for sick mothers

Critical Care is a level of care and not a place. It can be delivered wherever the facilities and appropriately qualified staff are available. Critical care should be provided as soon as it's required and not wait for transfer.

Key Points

- Mothers who look or feel unwell and/or have a 'feeling of impending doom' should be thoroughly assessed
- Pregnant women can compensate for serious illness and then rapidly deteriorate
- Use MEWS to detect deterioration and include at every SBAR handover
- Assess ABCDE, treat and review response
- If no improvement – escalate care and make a diagnosis

To be used alongside the following guidelines:

- Analgesia in Labour including Accidental Dural Puncture.
- Sepsis and Pyrexia in labour
- Maternal Cardiac Arrest (OAA / Resus Council)
- Hypertension
- Care in labour
- Obstetric haemorrhage

AIMS Makes recommendations for care of the severely ill woman**.**

- Defines the responsibility of the relevant staff groups.
- Early identification of the severity of the illness using the MEWS / Critical Care Chart.
- Prevents delays in referrals and ensures early involvement of the relevant multidisciplinary staff.
- Enables rapid investigation and treatment.
- To achieve the best possible outcomes for woman and baby and reduce adverse outcomes.

SCOPE

This guideline applies to all obstetric, anaesthetic, midwifery and nursing staff.
It covers women in the Maternity Unit and women under the care of the Maternity Service in the Community, in Emergency Department (ED), High Dependency Unit (HDU), and Intensive Care Unit (ICU), or on a General Medical or Surgical Ward.

1. Introduction

The purpose of this guideline is to ensure early recognition of the deteriorating pregnant (after 18 weeks gestation) or postnatal woman (within 6 weeks post-delivery). The early detection of severe illness in mothers remains a challenge to all involved in their care. The relative rarity of such events combined with the normal changes in physiology associated with pregnancy and childbirth compounds the problem.

2. Maternity Early Warning System (MEWS)

Parameters

- MEWS is a trigger tool / observation chart used to improve the detection of critically ill women.
- At present there is no nationally agreed MEWS tool or chart for England, the group are aware this being developed and the guideline will be updated once this is available
- The parameters have been agreed based on the Scottish national MEWS chart and guidance from the RCOG / MBBRACE with local input.
- BadgerNet has an embedded MEWS trigger tool and chart
- The score is calculated as follows
    - Red =2
    - Yellow=1
    - Normal=0
- The early warning score is calculated using the following physiological parameters:

Physiological Parameters	Red	Yellow	Normal	Yellow	Red
Respiration Rate	≤9		10-20	21-24	≥25
Oxygen Sats (%)	≤94		95-100		
Temperature (◦C)	≤35.9		36-37.4	37.5-37.9	≥38
Heart Rate	≤49	50-59	60-104	105-119	≥120
Systolic BP	≤89	90-99	100-139	140-159	≥160

Diastolic BP			40-89	90-109	≥110
Neuro (AVPU)			A (alert)		V,P or U
Urine Output		<30	>30		
Urine Protein				+ or ++	≥+++
Looks Unwell			No		Yes
Agitated or Confused			No		Yes

Antenatal – urine output monitoring is not part of routine MEWS assessment. Indications for monitoring output and fluid balance such as preeclampsia or sepsis should lead to an individual clinical plan.

Intrapartum – observations recorded as part of labour care will also provide a MEWS score

Postnatal observations should also include lochia – offensive or heavy.

Additional observations such as patellar reflexes and capillary refill may be clinically indicated but do not form part of the MEWS tool. They should be documented in the records.

When to use MEWS:

- MEWS observations must be used for all women having in patient care, antenatal, intrapartum and postnatal.
- MEWS will also be used in the Maternity triage setting and can be commenced in any setting where there is clinical concern
- **All women** should have MEWS observations performed on admission. The frequency of ongoing observations should be determined by the admitting obstetric team or midwife (or the relevant guideline where applicable)
- Women who are pregnant or postnatal (up to 42 days) receiving in patient care in any area of the Trust should have observations with a Maternity specific EWS and not the general adult NEWS tool.

Actions and Escalation in response to the MEWS score:

MEWS SCORE	Immediate Actions	Escalation and Response
0	Continue routine care	Only if new concerns
1	Inform midwife Increase observation frequency to 4hrly	Midwife to assess within 1hr Simple intervention Consider Obstetric Review depending on repeat MEWS score and clinical picture
2 or 3	Inform shift leader Increase observation frequency to 2hrly	SHO review within 1 hr ABCDE assessment and plan Senior review if no improvement in MEWS with intervention
4 or more	Inform shift leader Repeat obs every 15min	Registrar or Cons Review within 15 min Inform Anaesthetist bleep 5011 ABCDE assessment and plan Consider transfer to labour ward HDU

Maternal Collapse or Seriously Unwell Woman → **Call for Help** → **2222 call** Obstetric Emergency and / or Adult Priority

Clinical Care for the potentially deteriorating woman

- ABC measures as appropriate – inform senior midwife and/or the shift leader / Obstetric Team.
- Contact the Obstetric Team for review - using an SBAR handover
- Follow the escalation response for the timing of obstetric review – either 15 minutes or within 60minutes
- Consider calling the anaesthetist bleep 5011
- It may be appropriate to summon the obstetric team using a 2222 call
- Obtain IV access and send any relevant bloods
- Consider sepsis triggers – if present start Sepsis 6
- Repeat MEWS observations
- Obstetric team to undertake a full ABCDE assessment
- A plan should be documented detailing frequency of observations, interventions and transfer if needed
- Assess response to interventions and repeat MEWS score
- If no improvement – escalate care
- Critical Care Outreach Team (CCOT) available to review any critically unwell women
- Once the maternal condition is stabilised, fetal wellbeing can be assessed and a CTG commenced if appropriate for gestation.

MANAGEMENT PLAN

A Management Plan must be formulated by the multidisciplinary team with set timescales for review and frequency of observations. This must be documented in the record in BadgerNet.

Where there is no improvement in the patient within 1 hour, this must initiate immediate Consultant Obstetrician and Consultant Anaesthetic input and, if necessary, HDU/ITU admission. The Consultant Obstetrician and Anaesthetist must consider the need for senior medical or surgical referral at this time

MATERNAL COLLAPSE

Observations that Trigger an Emergency Response
AIRWAY – Partial or complete obstruction
BREATHING - Respiratory rate of < 5 or > 35 breaths per minute
CIRCULATION - Maternal pulse < 40 or > 140 beats per minute. Systolic BP of < 80 or > 180
DISABILITY – Reduced conscious level, P or U on AVPU should prompt emergency response

- Initial management of any cause of shock is the same = Resuscitation.
- Commence basic life support (ABC) - refer to **Adult Resuscitation Guideline.**
- **Remember manual displacement (or tilt) to prevent compression of aorta and vena cava for antenatal women >20 weeks.**
- Oxygen.
- Help – 2222 OBSTETRIC EMERGENCY or MATERNAL CARDIAC ARREST and consider requesting Neonatal Team.
- Investigations to determine specific cause as directed by consultant obstetrician and consultant anaesthetist.

Enhanced Maternal Care and Critical Care

'Early recognition of critical illness, prompt involvement of senior clinical staff and authentic multi-disciplinary team working remain the key factors in providing high quality care to sick pregnant and postpartum women.' MBRRACE 2016.

Women who develop complications during or after pregnancy require a higher level of care than that routinely available on Delivery Suite or the ward. In addition women with significant pre-existing medical disease may also need a heightened level of surveillance.
Admission to the observation bay or a single room on Delivery Suite for Enhanced Maternal Care (EMC) in these cases provides this higher level of care.

Enhanced maternal care is driven by a set of competencies required to care for women with medical, surgical or obstetric problems during pregnancy, peri- and post-partum but without the severity of illness that requires admission to a critical care unit. This care can be provided by any practitioner with the necessary skills. EMC may overlap with level 2 care.

Levels of care (Faculty of Intensive Care Medicine)

Level 0
Patients whose needs can be met through normal care in an acute hospital

Level1
Patients at risk of their condition deteriorating, or those recently relocated from higher levels of care, whose needs can be met on an acute ward with additional advice and support from the critical care team.
Level2
Patients requiring more detailed observation or intervention including support for a single failing organ system, enhanced postoperative care or those 'stepping down' from higher levels of care.
Level3
Patients requiring advanced respiratory support alone or basic support together with support for at least 2 organ systems. This level includes all complex patients requiring support for multi-organ failure.

Responsibilities of Relevant Staff Groups
MBRRACE have recommended that multiprofessional working across boundaries from obstetricians, midwives , anaesthetists and critical care is required for all women who become critically ill during or after pregnancy.
All women requiring EMC should be reviewed on the multi professional ward round twice daily.

Midwives /Nurses
Staff appropriately trained for enhanced maternal care should be available 24 hours per day. This may be by a midwife with HDU training or nurses with critical care expertise. The midwife to patient ratio would be determined by the clinical picture. This may be 1:2 in circumstances when the woman is stable in the postnatal period or 1:1 where the woman is unstable or intrapartum. In the event that staff with appropriate training and competencies are not available on delivery suite then an individual plan for place of care should be made involving Critical Care outreach, the midwifery manager on call and the obstetric and anaesthetic consultants.

Anaesthetists
The most senior anaesthetist should be available to attend the multidisciplinary ward round each morning to ensure that optimum care is given to the woman. Ideally an anaesthetist should attend the multi professional night ward round. An anaesthetist provides 24 hour labour ward cover to assist with fluid management, cardiovascular stabilisation, haemodynamic monitoring and pain management e.g. epidural and patient controlled analgesia (PCA).

Obstetricians
The consultant on call should be involved in the planning of care and each woman should be reviewed at least twice each day to optimise care and a management plan clearly documented in their notes.

Clinicians outside the maternity service:
Women may need input from other specialties. The decision to refer should be made on the multiprofessional ward round or by the most senior obstetric or anaesthetic clinician.
Specialties who may provide input include (this list is not exhaustive) and are contactable by switchboard:

- Renal
- Microbiology
- Haematology
- Neurology
- General Medicine and Cardiology
- Radiology and Interventional radiology
- Surgery

The referral should be clear and concise, use an SBAR approach and be documented with an expected timeframe for specialty input. Where the condition of the woman is deteriorating a Consultant to Consultant phone call may be required.

Potential Indications for Enhanced Maternal Care
Obstetric complications:

- Severe preeclampsia (see Hypertension guideline)
- Obstetric Haemorrhage (1.5l)
- Sepsis

Deterioration / MEWS score>4
Significant Pre-existing medical disease

- elective admission for observation after delivery

In some circumstances admission to a medical ward or adult critical care ward (eg ICU, CCU) may be indicated and an individual plan of care made by the most senior obstetrician and anaesthetist.
If in doubt, discuss with anaesthetic/obstetric team

Documentation and Observations
A MEWS chart for observations should be maintained for all women.
Observations should be taken hourly as a minimum and fluid balance recorded until a clear, individual plan is documented.
All women require a VTE risk assessment, PUP score and a cannula and urinary catheter surveillance Form.

The ward round should document:

- A clear management plan including frequency of observations and investigations required
- Twice daily thorough systems based clinical review. Women with conditions such as sepsis or severe preeclampsia are at risk of respiratory and cardiovascular complications and a simple obstetric assessment is not sufficient.
- Formal Duty of Candour documentation may be required
- A plan for ongoing care on transfer to the ward

Transfer to Intensive Care Unit (ICU)

- The decision to transfer a woman to the ICU should be made by the most senior obstetrician, anaesthetist on call and any other appropriate specialist (e.g.haematologist) in conjunction with the relevant Critical Care team.
- Out of hours, the on-call consultant obstetrician and consultant anaesthetist must be involved in the decision to transfer a patient to the ICU.

Potential Clinical Conditions requiring ICU care:
Any woman who requires level 3 care and where level 2 care not suitable on Delivery Suite - This list is not exhaustive.
Respiratory • **Severe community-acquired pneumonia (including COVID, influenza)** • **Pulmonary oedema** • **Severe asthma** • **Pulmonary embolism** • **Bronchospasm**
Haematology • **Massive haemorrhage / DIC**

• **TTP**
Cardiovascular • **Severe uncontrolled hypertension** • **Cardiomyopathy / Failure** • **ACS / dissection / arythmia**
Sepsis **Obstetric related: chorioamnionitis, postoperative, mastitis, urinary tract infection.** **Non-obstetric: influenza, pneumonia, meningitis.**
Neurological • **Status epilepticus** • **Meningitis** • **Intracerebral bleed** • **Malignancy** • **Guillain-Barre syndrome**
Renal • **AKI requiring filtration / dialysis** • **HUS**

Process
Seek input early from Critical Care Outreach Team (CCOT) and/or ICU team (out of hours) where a woman is deteriorating.
A concise and clear summary using an SBAR format should be provided.
If ICU admission is delayed, the Obstetric and Anaesthetic Consultant should directly contact the ICU consultant to discuss ongoing care, critical care should be provided whilst transfer is awaited.
The details of all women admitted to Critical Care should be sent to the Quality and Safety team to (either by Datix or email)

Handover of Care
The anaesthetist accompanying the patient usually gives a thorough handover to the Critical care team, especially if they have had input in stabilising the woman i.e. massive haemorrhage.
The midwife/ nurse will handover care to the Critical Care nurse using a SBAR approach
All patients who are admitted to ICU should be entered on to the 'outlier section' of the labour ward board and be discussed at each handover and the daily MDT safety huddle.

Obstetric and Midwifery Input during stay in ICU
Women should initially be reviewed on a daily basis by the Obstetric Consultant, either CoW or the on call Consultant.
Midwifery input will be required for family support, potential feeding / expressing, lochia and wound care

IMPLEMENTATION AND TRAINING

Dissemination of this policy and procedures will occur through teaching in PROMPT, simulation, skills and drills session and in house education sessions within the maternity unit in line with the Training Needs Analysis (TNA). Refer to Staff Training Needs Analysis regarding recognition of the severely ill pregnant woman and Maternal Resuscitation.

References:

Care of the critically ill woman in childbirth; enhanced maternal care. Joint Working Group OAA, RCoA, FICM, RCM and RCOG 2018

Intensive Care Society Levels of Critical Care for Adult Patients (2009)