# Pre-Eclampsia and Eclampsia Guideline

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## Ratification Record

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## Consultation

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### Document Control / History

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6. Procedures.

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Document Summary

This guideline describes the process by which women with severe Pre-eclampsia and eclampsia are managed including:

- The assessment and diagnosis of pre-eclampsia.
- Communication between care providers.
- Management of blood pressure and fluid balance.
- Assessment of the fetus and delivery planning.
- Management of pre-eclampsia, eclampsia and HELLP syndrome.
- Postnatal follow up.

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1. Introduction

Severe pre-eclampsia and eclampsia are relatively rare but serious complications of pregnancy, with around 5:1000 maternities in the UK suffering severe pre-eclampsia and 5: 10,000 maternities suffering eclampsia. In the MBRRACE report released in November 2018 the maternal mortality rate due to pre-eclampsia and eclampsia was 0.26:100,000 maternities. Although this number remains low there is no evidence of an ongoing decrease in the numbers and substandard care has persistently been demonstrated in a significant percentage of the deaths nationally. The aim of this guideline is to standardise the approach to the management of pre-eclampsia and eclampsia in the immediate pre- and post-delivery interval in order to improve the outcome for the mother and child.

2. Purpose

The purpose of these guidelines is to outline the management of Pre-eclampsia, Eclampsia and HELLP syndrome.

3. Definitions

**Hypertension:** Blood pressure of 140 mmHg systolic or higher, or 90 mmHg diastolic or higher

**Severe hypertension:** Blood pressure over 160 mmHg systolic or over 110 mmHg diastolic

**Chronic hypertension:** hypertension that predates the pregnancy, or is noticed before 20 weeks.

**Gestational hypertension:** new onset hypertension in pregnancy, after 20 weeks, without proteinuria or blood test anomalies.

**Pre-eclampsia:** New onset of hypertension (over 140 mmHg systolic or over 90 mmHg diastolic) after 20 weeks of pregnancy and the coexistence of 1 or more of the following new-onset conditions:

- proteinuria (urine protein: creatinine ratio of 30 mg/mmol or more or albumin: creatinine ratio of 8 mg/mmol or more, or

Other maternal organ dysfunction:

- renal insufficiency (creatinine 80 micromol/litre or more)
- liver involvement (elevated transaminases [ALT or AST over 40 IU/litre] with or without right upper quadrant or epigastric abdominal pain)
- neurological complications such as eclampsia, altered mental status, blindness, stroke, clonus, severe headaches or persistent visual scotomata
- haematological complications such as thrombocytopenia (platelet count below 150,000/microlitre), disseminated intravascular coagulation or haemolysis
- uteroplacental dysfunction such as fetal growth restriction, abnormal umbilical artery Doppler waveform analysis, or stillbirth.

Pre-eclampsia is a multi-system disease, where end-organs (e.g. cardio-vascular, renal, central nervous, hepatic, coagulation and placenta) may be affected to a greater or lesser extent occurring from 20 weeks of pregnancy onwards. Careful assessment of each end organ is
essential for optimal management. Pre-eclampsia progresses at different rates and occasionally can be remarkably rapid or fulminating.

**Eclampsia:** the onset of grand mal seizure activity and/or unexplained coma during pregnancy or postpartum in women with pre-eclampsia.

**HELLP syndrome:** occurs in approximately 10% of pregnant women with pre-eclampsia or eclampsia. It is a life-threatening obstetric complication usually considered to be a variant of pre-eclampsia.

### 4. Duties (and Responsibilities)

#### 4.1 Directorate Midwifery Managers
It is the responsibility of the Directorate midwifery managers to ensure that midwives are aware of the guideline and its application in practice.

#### 4.2 Midwives and Obstetricians
It is the responsibility of the midwives to ensure that they undertake training to maintain the skills and knowledge necessary for managing women with all types of hypertension.

### 5. Communication

It is imperative when women are admitted with severe pre-eclampsia that there is good communication between all departments. There needs to be a multidisciplinary team approach.

- The consultant obstetrician will take the lead for making decisions about the obstetric management of the woman.
- The anaesthetist will take the lead for making decisions about the resuscitation of the woman.
- Both will document the agreed plan clearly in the notes and will make sure it is communicated to the team caring for the mother.

#### 5.1 Delivery suite coordinator
It is the responsibility of delivery suite coordinator to ensure:

- An experienced midwife is allocated to provide care for women with severe pre-eclampsia.
- Any necessary bloods are sent to pathology laboratory and that results are promptly available.
- Liaise with the paediatric team if necessary.
- Clear handover of care at each shift change.

#### 5.2 Obstetrician
It is the responsibility of obstetrician in cases of severe pre-eclampsia to ensure:

- Liaison with the anaesthetists regarding fluid management of the woman.
- The consultant obstetrician is informed
- Clear documented management plans are written in the woman hand held notes.
- Prepare for emergency surgery if necessary.
- Clear handover of care at each shift change.
5.3 Anaesthetist
It is the responsibility of the anaesthetists in cases of severe pre-eclampsia to ensure:
- Assistance with IV access if not already obtained.
- Management of the woman’s fluid management, if requested.
- Assessment of the woman for anaesthetic or pain relief for labour.
- Inform the consultant anaesthetist
- Clear handover of care at each shift change.
- Contact the ITU in cases of severe eclampsia, HELLP or any case requiring admission to the main ITU.

5.4 Paediatrician
It is the responsibility of the paediatrician in cases of severe pre-eclampsia to ensure:
- Liaison with the obstetrician regarding timing of delivery.
- Communication with the parents if the baby is preterm.

6. Reducing the risk of developing pre-eclampsia
In the presence of any of the following major risk factors, commence 150mg aspirin from 12 weeks:
- hypertensive disease during a previous pregnancy
- chronic kidney disease
- autoimmune disease such as systemic lupus erythematosus or antiphospholipid syndrome
- type one or type two diabetes
- chronic hypertension

In the presence of more than one of the following moderate risk factors, commence 150mg aspirin from 12 weeks:
- first pregnancy age 40 years or older
- pregnancy interval of more than 10 years
- body mass index (BMI) of 35 kg/m² or more at first visit
- family history of pre-eclampsia
- multi-fetal pregnancy

Carry out an ultrasound for fetal growth and amniotic fluid volume assessment and umbilical artery Doppler velocimetry starting at between 28 and 30 weeks (or at least 2 weeks before previous gestational age of onset, if earlier than 28 weeks) and repeating 4 weeks later in women with previous:
- severe pre-eclampsia (requiring ITU, suffering from eclampsia or pulmonary oedema)
- pre-eclampsia that resulted in birth before 34 weeks pre-eclampsia
- pre-eclampsia that resulted in a baby whose birth weight was less than the 10th centile
- intrauterine death
- placental abruption
7. Assessment, Diagnosis and Management of Uncomplicated Pre-eclampsia

The initial assessment should be made during the antenatal booking visit. Referral to a Consultant clinic should be made for any woman with a history of previous pre-eclampsia or any known risk factors. (See guideline WAC064 Antenatal Risk Assessment)

Appointments can be made at the next available antenatal clinic or if the situation is urgent, referral to the fetal assessment unit or Labour ward will be necessary.

The following are conventional diagnostic criteria, although the disease is sometimes suspected when blood pressure and proteinuria are not at diagnostic levels. Any management plan must be discussed with the consultant obstetrician and documented.

7.0 Clinical assessment

- Check blood pressure (see method for measuring BP below).
- Send urine sample Protein/Creatinine measurement.
- Pre-eclampsia is suspected when the diastolic B/P measures >110 mmHg on any one occasion, or >90 mmHg on 2 or more occasions at least 4 hours apart
- Use 30 mg/mmol as a threshold for significant proteinuria
- Ask the woman about warning symptoms such as headache, visual disturbances and epigastric pain.
- If dipstick screening is positive (1+ or more), use albumin: creatinine ratio or protein: creatinine ratio to quantify proteinuria
- If using albumin: creatinine ratio as an alternative to protein: creatinine ratio to diagnose pre-eclampsia in pregnant women with hypertension: use 80 mg/mmol as a diagnostic threshold
- Do not routinely use 24-hour urine collection to quantify proteinuria in pregnant women.

Note: Epigastric pain in the second half of pregnancy should be considered to be the result of pre-eclampsia until proven otherwise.

- Examine her abdomen looking for epigastric pain and liver edge tenderness.
- Check her reflexes looking for hyper reflexes and clonus.
- Send blood specimens for:
  - Full Blood Count including Platelet count.
  - Clotting screen (if platelets < 100 x10^9/l).
  - Urea & electrolytes and Creatinine levels
  - Liver Function Tests.
  - Glucose if ALT>150, to exclude acute fatty liver.
  - Group and save, antibody screen.
- Send mid-stream urine specimen to exclude infection (if leucocytes and/or nitrites+).
7.1 Method for measuring blood pressure

Measure B/P using the appropriate cuff size place at the level of the heart with the woman sitting at a 45-degree angle. Adult cuff is ideal for most women, large adult cuff if upper arm circumference >33cm.

Multiple readings should be used to confirm the diagnosis. A single reading of severe hypertension should not lead to delays in treatment due to efforts in obtaining multiple readings.

If using a Dinamap note the mean pressure as well as the systolic / diastolic and check apparent borderline readings with a manual sphygmomanometer. Automated oscillometric devises may underestimate BP compared with auscultatory techniques. If BP ≥ 140/90, check every four hours with a manual sphygmomanometer.

7.2 Inpatient management for uncomplicated pre-eclampsia

Advise admission to hospital for surveillance and any interventions needed if there are concerns for the wellbeing of the woman or baby.

Concerns could include any of the following:

- sustained systolic blood pressure of 160 mmHg or higher
- any maternal biochemical or haematological investigations that cause concern, for example, a new and persistent: rise in creatinine (80 micromol/litre or more) or rise in ALT (over 70 IU/litre, or twice upper limit of normal range) or fall in platelet count (under 150,000/microlitre)

Once admitted:

- BP four hourly initially and then as appropriate.
- Commence/continue oral anti-hypertensives.
- Daily urinalysis initially then as appropriate
- Twice daily cardiotocograph
- Measure full blood count, liver function and renal function twice a week.
- If severe pre-eclampsia: measure full blood count, liver function and renal function three times a week
- Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every two weeks

7.3 Outpatient management for uncomplicated pre-eclampsia

Chronic hypertension:

In women with chronic hypertension, carry out an ultrasound for fetal growth and amniotic fluid volume assessment, and umbilical artery Doppler velocimetry at 28 weeks, 32 weeks and 36 weeks.

Gestational hypertension

- Measure full blood count, liver function and renal function at presentation and then
weekly

- Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every two to four weeks, if clinically indicated

- Severe gestational hypertension: Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every two weeks

- Severe gestational hypertension: Carry out a CTG at diagnosis and then only if clinically indicated

- BP and urinalysis checks twice weekly (if prescribed oral hypertensives), daily urinalysis if admitted

**Pre-eclampsia:**

Measure full blood count, liver function and renal function twice a week.

Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every two weeks

| If the urine measurement for Protein/Creatinine ratio (PCR) is increased when a diagnosis of pre-eclampsia is made, no further tests for urine dipstick or PCR are required |

### 7.4 Blood Pressure Control in Pre-eclampsia

**The aim of management and drug therapy is to:**

- Reduce the diastolic pressure to less than 100mm Hg.
- To prevent or slow the development of severe pre-eclampsia and its accompanying multi-organ derangement.
- Prevent eclamptic fits
- To aid anaesthetic management.

**7.5 Oral antihypertensive therapy:**

- If there is a sustained systolic blood pressure of 140 mmHg or higher or sustained diastolic blood pressure of 90 mmHg or higher, commenced antihypertensive treatment.

- 1st line antihypertensive therapy is Labetolol: oral dose from 100 mg twice daily to 100 mg three times a day; max dose is 600mg four times a day. (Use should be avoided in women with asthma).

- Or Nifedipine: 10 to 20mg slow release. Twice daily. (Maximum dose is 40 mg twice daily). To be used for women with asthma

- 3rd line antihypertensive therapy Doxazosin 1mg daily (maximum dose is 8 mg daily).

If the woman has ongoing asthma requiring regular medication or seasonal asthma choice of medication will be based individual characteristics.

Particular attention should be given to the treatment of high systolic pressures in order to avoid intracranial haemorrhage.
7.6 Decision to deliver

Recommend delivery within 24-48 hrs for women with mild to moderate pre-eclampsia after 37 weeks. Mode of delivery will generally be a vaginal birth unless other contraindications to this are present.

After 37 weeks, a blood pressure greater than 160/110 mmHg should lead to a decision to deliver.

For women with chronic hypertension whose blood pressure is lower than 160/110 mmHg after 37 weeks, with or without antihypertensive treatment, timing of birth and maternal and fetal indications for birth should be agreed between the woman and the senior obstetrician.

For women with gestational hypertension whose blood pressure is lower than 160/110 mmHg after 37 weeks, timing of birth, and maternal and fetal indications for birth should be agreed between the woman and the senior obstetrician.

Record maternal and fetal thresholds for planned early birth before 37 weeks in women with pre-eclampsia. Thresholds for considering planned early birth could include (but are not limited to) any of the following known features of severe pre-eclampsia:

- inability to control maternal blood pressure despite using three or more classes of antihypertensives in appropriate doses
- maternal pulse oximetry less than 90%
- progressive deterioration in liver function, renal function, haemolysis, or platelet count
- ongoing neurological features, such as severe intractable headache, repeated visual scotomata, or eclampsia
- placental abruption
- reversed end-diastolic flow in the umbilical artery doppler velocimetry, a non-reassuring cardiotocograph, or stillbirth.

7.7 Management of second stage of labour

Do not routinely limit the duration of the second stage of labour in women with controlled hypertension.

Consider operative or assisted birth in the second stage of labour, for women with severe hypertension whose hypertension has not responded to initial treatment.
8. Assessment, Diagnosis and Management of Severe Pre-eclampsia

8.1 Diagnosis of Severe pre-eclampsia

Severe pre-eclampsia is confirmed when one or all of the following are present:

- Systolic ≥160 - on two occasions, four hours apart.
- Diastolic ≥110 mmHg – on two occasions, four hours apart.
- Oliguria ≤ 400 ml/24 hrs.
- Raised Creatinine – in pregnancy this is > 80.
- Pulmonary oedema.
- Cerebral or visual disturbances – headache, hyper reflexes.
- Epigastric pain – hepatic tenderness.
- Coagulopathy/ thrombocytopenia.
- HELLP syndrome.
- Hepatic rupture.

On admission a Middle Grade Staff must carefully assess all such women and the Consultant must be informed. A plan of management should be clearly indicated on the notes. The Anaesthetist, Paediatrician and the SCBU staff should be informed. Eclampsia carries a high fetal and maternal mortality and must be treated as an extreme emergency.

- The woman must be nursed in the obstetric high dependency unit (HDU) and observations recorded on the HDU chart.
- Consultant on call / in charge of the case is informed when possible.
- Consultant and middle grade anaesthetist on call for Labour Ward are informed.
- Measure full blood count, liver function and renal function three times a week.
- Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every two weeks.

8.2 Blood Pressure Control in Severe Pre-eclampsia

If the B/P fails to settle, intravenous antihypertensive medication should be commenced. Antihypertensive treatment in severe PET aims to reduce MAP to < 125 mmHg and NOT achieve normotension.

8.2.1 Intravenous antihypertensive therapy:

- Initial administration: Intravenous Labetalol 20mg over two minutes. Followed by 20mg every 10 minutes up to a maximum of four doses (80mg).

- Maintenance: Intravenous infusion of Labetalol 200mg made up to 50ml with Normal Saline infused initially at 40mg/hr (10ml/hr). Increase incrementally every 30 minutes up to a maximum dose of 160mg/hr (40ml/hr).

If Labetalol is contraindicated:

- Initial administration: Hydralazine is given as slow intravenous injection of 5mg repeated every 20 minutes, to a maximum cumulative dose of 20mg (except in the presence of tachycardia with a
pulse of > 120 beats per minute).

- Maintenance: Intravenous infusion of Hydralazine 20mg made up to 60 ml with Normal Saline, infused initially at a rate of 5mg/hour (15ml/hour)

The B/P should be measured every 5 minutes for the first 30 minutes of the treatment and the fetal heart should be monitored continuously. The B/P should then be measured every 15 minutes. Increase incrementally every 30 minutes to maintain the diastolic BP between 90/95 mmHg diastolic. Maximum dose should not exceed 20mg / hour(60ml/hr)

- If intravenous therapy necessary, consider the need of an arterial line.

**8.2.2 Magnesium Sulphate (see appendix 2)**

The risk of eclampsia in women with severe pre-eclampsia is reduced by more than 50% with the use of prophylactic Magnesium Sulphate (MgSO₄). Magnesium Sulphate is the drug of choice for both prevention and treatment of eclampsia

**Indications for Magnesium Sulphate administration (no ECG monitoring):**

Consider the need for magnesium sulphate treatment, if one or more of the following features of severe pre-eclampsia is present:

- ongoing or recurring severe headaches
- visual scotomata
- nausea or vomiting
- epigastric pain
- oliguria and
- severe hypertension
- progressive deterioration in laboratory blood tests (such as rising creatinine or liver transaminases, or falling platelet count).

**Cautions:**

- Oliguria < 20mls/hour.
- Creatinine > 100.

**Contraindications (for discussion with consultant):**

- Cardiac disease.
- Acute renal failure.

**Administration:**

- **Loading dose: 4 g MgSO₄ bolus**
  Draw up 50ml vial of pre-diluted magnesium sulphate and infuse the first 20ml (4g) over 20 mins. (Infusion rate should therefore be set at 60ml/hr) Doctor to be present for at least 10 minutes.

- **Maintenance dose: 1 g/hr MgSO₄ IV infusion**
  Continue with the remaining 30ml of MgSO4 solution and infuse at 5ml/hr (1g/hr)
The MgSO₄ infusion should be maintained for 24 to 48 hours after delivery or last seizure, whichever comes later.

8.3 Decision to Deliver

The best treatment is to deliver the baby. The mode of delivery should be individualised but remains a consultant’s decision.

Remember that initial stabilisation of the maternal condition leads to a safer outcome by whatever route. If the woman is stabilised on intravenous drug therapy, delivery within the next 12 hours should be considered.

If <34 weeks try to stabilise and gain time for steroids to act.
If >34 weeks, usually labour will be induced. Assess the state of the cervix, maternal condition and fetal wellbeing, and discuss with Consultant. If the cervix is favourable an artificial rupture of membranes may be performed. If the cervix is unfavourable, consider performing a Caesarean section.

Ensure that there is early anaesthetic assessment. This will ensure that the anaesthetic technique is planned in advance; the airway assessed and will help with the consideration of epidural analgesia when the mother is in active labour.

Ensure plan for delivery is discussed with the Neonatal Unit.

Antihypertensive treatment should continue through labour. Stabilisation of BP with oral treatment makes hypertension in labour, delivery and the postpartum period easier to manage, and may avoid the need for parenteral therapy.

8.4 Monitoring prior to delivery using the HDU chart

Maternal
- Six to twelve Hourly full blood count, urea & electrolytes, Creatinine levels, liver function tests, clotting screen.
- Blood group & save as caesarean section is always a possibility.
- 1/4 hourly BP and pulse.
- Arterial line to be considered for accuracy of BP monitoring and repeated blood samples including blood gases.
- Neurological observations (reflexes & optic fundi if indicated).
- Hourly urinary output measurement (catheter in situ).
- Strict fluid balance chart.
- Continuous cardiotocography.

Monitoring in labour / Induction of Labour
- Six to twelve hourly full blood count, urea & electrolytes, Creatinine levels, liver function tests, clotting screen.
- 1/4 hourly BP and pulse.
- Hourly urinary output measurement (catheter in situ) as long as urine output >20ml/hour, await resolution of PET. These patients are hypovolaemic so a diuretic is usually best avoided. If oliguria (<80mls/4hours) check serum Creatinine.
- Strict fluid balance chart.
- Oral Ranitidine 150mgs 6 hourly.
- Continuous cardiotocography.
8.5 Fluid balance control

Strict fluid monitoring is important in women with severe pre-eclampsia, as fluid overload can lead to pulmonary hypertension, and a decreasing urine output or excessive positive fluid balance has to be addressed urgently as it could be a sign of the condition deteriorating.

Fluid monitoring is usually the responsibility of the anaesthetic team and should be discussed with them.

- Urinary output must be measured hourly.
- Fluid intake maximum 85ml/hr IV or as prescribed by the anaesthetist.
- If a Central Venous Pressure (CVP) line is used, it is important that trends are monitored and levels are kept below 5 mmHg (or 7mmH2O).
- Be prepared to increase the concentration of drugs in infusion fluid in order to reduce the volume infused.
- Staff should be aware that the woman needs strict fluid balance for at least forty-eight hours after delivery.

8.6 Analgesia during Labour

- Severe pre-eclampsia is not a contra-indication to epidural providing clotting is normal and platelets >75 x 10⁹ /1.
- All women with proteinuric hypertension should have platelets and clotting checked on admission, otherwise a delay in implementing epidural may occur.
- The Anaesthetist need not wait for clotting results unless platelets <100 x 10⁹ /1.
- If platelets 75-100, epidural only if clotting normal and the blood results are recent i.e. <2 hours.
- Remember that vasoconstriction is part of the pathophysiology of severe pre-eclampsia and very careful attention to fluid balance is mandatory, particularly with an epidural.
- Epidural top-ups from the Levobupivacaine 0.1% with fentanyl 2μg/ml mixture given slowly with BP monitoring. Initial dose to be given over 15min in three 5mls boluses. The anaesthetist is to remain with the mother until satisfactory analgesia is achieved and ensure that cardiovascular stability is maintained.
- Care must be taken to anticipate and prevent an excessive fall in BP, usually by means of judicious pre-loading.
- Hypotension results from the inevitable vasodilatation associated with epidural blockade being superimposed upon hypovolaemia, which can precipitate fetal distress. Beware of fluid overload and pulmonary oedema (especially with Oxytocin).
9. Assessment, Diagnosis and Management of Eclampsia

Eclampsia complicates about 1:2000 deliveries in Europe and developed countries. Almost half the cases occur post-partum and around 40% before a diagnosis of pre-eclampsia has been made. Hypertension may not have developed at this stage.

Any woman who presents fitting in late pregnancy and labour should be regarded as eclamptic unless proven otherwise. Alternative diagnoses include epilepsy, embolism (clot, amniotic fluid, air), intra-cerebral pathology (tumours, vascular malformations, haemorrhage), and local anaesthetic toxicity.

9.1 Management of Eclamptic fits

Prompt management is needed once a fit is observed. There is a risk of morbidity and mortality to the mother if the seizures are not treated.

The main risks of an eclamptic fit are:
- Hypertensive crisis & cerebrovascular accident.
- Convulsions.
- HELLP syndrome.
- Abruptio.

9.1.2 The immediate actions required are:
- Emergency bleep (2222 stating “Obstetric Emergency + ward”).
- Do not leave the woman unattended.
- Turn her on the left lateral position and ensure woman’s safety.
- Establish a clear adequate airway and administer oxygen via face mask.
- Treat / control convulsions with intravenous therapy (see below).
- Control blood pressure where required.
- Initiate fluid management (Anaesthetic).
- Inform Consultant Obstetrician and Anaesthetist.
- Provide Obstetric High Dependency Care and Notify ITU where necessary.

9.1.3. Lines of communication:
- The Consultant Obstetrician will take the lead for making decisions about the obstetric management of the woman.
- The anaesthetist will take the lead for making decisions about the fluid management and resuscitation of the woman and liaising with ITU if necessary post delivery.
- The Delivery suite co-ordinator is responsible for ensuring obstetric and anaesthetic instructions are carried out; liaising with the necessary departments and personnel, including SCBU and the paediatric team and ensuring experienced midwifery care is provided to the woman.

9.2 Management of recurrent fits after starting Magnesium Sulphate

If recurrent fits occur, inform Consultant Anaesthetist and ITU and consider giving another anticonvulsant in the presence of the anaesthetist covering the labour ward.
• Treat recurrent seizure with a further bolus of MgSO₄ 2g over five minutes. If possible take blood for Magnesium levels prior to additional bolus.

• If further seizures occur despite above, the anaesthetist should consider:
  o Diazemuls 10mg IV bolus and then an infusion (2.5mg/hr).
  o Thiopentone infusion (on Intensive Care Unit).
  o Consider paralysis and ventilation.

10. HELLP syndrome

HELLP syndrome (Haemolysis, Elevated Liver enzymes and Low Platelets) is a multi-system disease. Its cause is unknown but is thought to be secondary to pre-eclampsia. Approximately 15% of patients with HELLP syndrome have blood pressure within the normal limits. HELLP syndrome can be difficult to diagnosis in these cases because of its vague and varied symptoms which can be attributed to other causes. Symptoms include:

• Generally feeling unwell and flu like symptoms can occur in 90% of patients.
• Nausea and vomiting occurs on 50% of patients, this can be confused with the normal nausea and vomiting that a high percentage of women get in labour and post delivery.
• Epigastric pain, this is an important sign, which can occur in 65% of patients. It can be confused with muscle spasm or heartburn, but is not relieved with antacids or analgesia. It is thought to be caused by stretching of liver capsule.
• It is thought that only 25% of patients with HELLP syndrome develop it in the postnatal period as it is more commonly seen in the antenatal period.

10.1 Investigations and observations

As for severe pre-eclampsia.

10.2 Management of women with HELLP syndrome

• These patients must be looked after in HDU/ITU, once diagnosed.
• Monitor blood glucose, blood films (for haemolysis) and clotting studies.
• Arrange for an urgent Ultra-sound Scan of upper abdomen to exclude sub capsular haematomas if the woman has upper abdominal pain. If a subscapular haematoma of the liver is found, Liaise with the Liver Unit (Kings College Hospital) & consider transfer if appropriate.
• If urine output poor in the presence of adequate central filling, consult renal physician and consultant on ITU to organise renal support
• The only definitive treatment for HELLP syndrome is delivery. Postpartum HELLP syndrome needs supportive treatment. This includes careful monitoring of the blood pressure, restriction of fluids, renal support. Admission to main ITU to be considered.
• If blood pressure is raised, consider Labetalol or Hydralazine infusion. The use of Hydralazine and magnesium sulphate to control any blood pressure have to be carefully monitored due to change in pharmacokinetics linked to the poor renal function in HELLP syndrome, these drugs can become toxic.
• If there is evidence of bleeding or the platelets count is <50, consider platelet transfusion. Discuss with Consultant Haematologist

• Early discussion with the intensive care consultant is essential as well as discussion with the King’s liver unit in the event of subscapular haematoma of the liver.

11. Post-Partum Management of Women with Pre-eclampsia and Eclampsia

• If a woman has taken methyldopa to treat chronic hypertension during pregnancy, stop within two days after the birth and change to an alternative antihypertensive treatment

• After delivery, mothers should be kept under observation on HDU for at least 24-48 hours, with careful monitoring of BP, fluid balance, urine output and symptoms.

• Anti-hypertensive treatment should be continued, but reduced progressively when the BP reaches 140/90 and stopped when it is 130/80 (NICE guidelines state to reduce if falls below 130/80 as opposed to stop). If BP is difficult to control an alternative can be used, e.g. Nifedipine (20mg SR once or twice daily) or Atenolol 50-100mgs once a day (daily).

• Offer enalapril as one option, to treat hypertension in women during the postnatal period. This should be coupled with appropriate monitoring of maternal renal function and maternal serum potassium. This is especially suitable for women who were on methyldopa before delivery.

• For women of black African or Caribbean family origin, with hypertension during the postnatal period, consider antihypertensive treatment with: Nifedipine or amlodipine

• For women with hypertension in the postnatal period, if blood pressure is not controlled with a single medicine, consider a combination of Nifedipine (or amlodipine) and enalapril. If this combination is not tolerated or is ineffective, consider either: adding atenolol or labetalol to the combination treatment or swapping one of the medicines already being used for atenolol or labetalol.

• Where possible, avoid using diuretics or angiotensin receptor blockers to treat hypertension in women during the postnatal period who are breastfeeding or expressing milk

• Low molecular weight Heparin and Thromboembolic device (TED) stockings should reduce significant risk of thrombo-embolism (see Thromboprophylaxis Guideline)

• No non-steroidal anti-inflammatory drugs (NSAIDS) (e.g. Diclofenac) for at least 24 hours post-partum and until blood results normalised due to potential adverse effects on renal and platelet function.

• Oliguria is common, especially post delivery and especially in the context of prolonged Oxytocic use. As long as urine output >20ml / hour, await resolution of PET. These patients are actually hypovolaemic so a diuretic is usually contra-indicated. If prolonged oliguria (<80mls / 4 hours) check serum creatinine.

• Until diuresis occurs, bloods should be taken regularly (initially 6 hourly) to monitor electrolytes, creatinine, FBC, clotting and LFTs. Diuresis usually signals resolution
unless there is underlying disease, and gradual reduction in antihypertensives and anticonvulsants can begin.

- IV fluids at 80-100mls per hour depending on output).
- Avoid diuretics in most cases. Furosemide should be considered if CVP levels / value are greater than 10 mmHg or there is persistent oliguria.

If a woman has had an eclamptic seizure, consider CT scans if clinically indicated to exclude cerebral haemorrhage, after stabilisation.

During postpartum, there is the added risk of circulatory overload leading to pulmonary oedema and cardio-respiratory failure. This occurs at approximately 24-48 hours postpartum. The problems are often related to the fluid given at and around delivery. It is to be remembered that the majority of the maternal deaths occur after delivery, mostly due to this.

### 11.1 Postnatal Follow up of Women with Pre-eclampsia, Eclampsia and HELLP Syndrome.

Women should be given a chance to debrief regarding their condition prior to discharge home. Any woman who had an eclamptic fit and/or if there is poor outcome for the baby, should have six weeks follow up appointment with the obstetric consultant.

Meeting with the anaesthetist to be offered to the woman.

The woman should be advised to continue on any oral antihypertensive therapy for at least six weeks, and have her B/P checked weekly by her G.P.

Advise women who have had a hypertensive disorder of pregnancy to discuss how to reduce their risk of cardiovascular disease, including hypertensive disorders, with their GP or specialist

Advise women who have had pre-eclampsia to achieve and keep a BMI within the healthy range before their next pregnancy (18.5–24.9 kg/m\(^2\)).

In women who have had pre-eclampsia or hypertension with early birth before 34 weeks, consider pre-pregnancy counselling to discuss possible risks of recurrent hypertensive disorders of pregnancy, and how to lower them for any future pregnancies.

If there are any neurological concerns the woman must have a CT scan before discharge home.

### 12. Documentation

A clear management plan for women with pre-eclampsia and eclampsia must be documented in the woman’s hand held notes. The High dependency chart specially designed for pre-eclampsia must be used to record observations. Women must have one to one nursing for at least 48 hours in the obstetric HDU or in ITU.

An incident form must be submitted for any woman in whom MGSO\(_4\) is used, if the woman has an eclamptic fit or is admitted to ITU.
13. Training and Implementation

Multidisciplinary training for midwives, obstetricians and anaesthetists are carried out through the annual mandatory skills drills training days as detailed in the Maternity Specialist Training Policy. (TNA) to ensure competency in diagnosis and management of hypertensive disorders is done.

13.1 Implementation and Dissemination

Many of the requirements documented within this guideline are in already place, but changes highlighted to this guidance will be disseminated via:

- Monthly newsletter
- Labour ward forum
- All medical and midwifery staff on induction

This guideline will be accessible electronically via the Trust intranet.

14. Monitoring Compliance with this Procedural Document

Process for monitoring compliance with this guideline

The Obstetric and Gynaecology Governance and Risk meetings will be the overarching committee to monitor compliance with this document. The minutes of these meetings will provide an accurate record of the discussions and action points identified. In addition reports are also presented to the Clinical Governance Risk committee to provide additional assurances that all staff completes mandatory training.

More detailed monitoring is described in the following table:

<table>
<thead>
<tr>
<th>Objective to be Monitored</th>
<th>Measure/Tool</th>
<th>Frequency</th>
<th>Lead</th>
<th>Reporting arrangements</th>
<th>Actions arising Including identifying Leads to take actions Forward in agreed timescales</th>
<th>Changes to practice And lessons Learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case review of all women with pre-eclampsia reviewing:</td>
<td>Incident forms</td>
<td>As necessary</td>
<td>Clinical Governance</td>
<td>Obstetric and Gynaecology Governance and Risk meetings Case presentations at Quality/audit meetings</td>
<td>Any deficiencies identified including Individual feedback to relevant practitioner re classification, delay etc Training needs identified</td>
<td>Dependent upon actions identified within specified time frame</td>
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<tr>
<td>Diagnosis of condition</td>
<td>Hand held notes</td>
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<td>Midwifery Manager</td>
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<td>Documentation of management plans</td>
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<td>Lead obstetrician for risk</td>
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<td>Involvement of all relevant personnel</td>
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<td>Prevention of seizures</td>
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<td>Delivery planning and assessment of fetal wellbeing</td>
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<td>Postnatal follow up</td>
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<td>Audit of all women with eclampsia and HELLP to ensure:</td>
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</table>
15. Associated Documents/Further Reading

WAC 072 Severely Ill Pregnant Women and High Dependency Care

16. References


MBRRACE-UK: Saving Lives, Improving Mothers’ care. Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2014–16

NICE Clinical Guideline 107: Hypertension in pregnancy. The management of hypertensive disorders during pregnancy


Royal College of Obstetricians and Gynaecologists, Royal College of Anaesthetists, Royal College of Midwives, Royal College of Paediatrics and Child Health. (2008). Standards for

Appendix 1

Why do the blood changes occur in Pre eclampsia?

Diffuse vascular endothelial dysfunction may cause widespread circulatory disturbances involving the renal, hepatic, cardiovascular, central nervous & coagulation systems.

There may be endothelial cell injury, microangiopathic platelet activation & consumption.

**Haematocrit. (Normal levels: 0.33 – 0.39 l/l)** This test provides an indication of the level of the haemoglobin concentration as a consequence of the reduced plasma volume. The higher the level, the more reduced the plasma volume and the more severe the pre-eclampsia is.

**Platelets (Normal level: 150 – 400 x 10⁹/l)** the platelet count decreases because they are used in aggregation following damage to the cell linings of the blood capillaries. Platelet count below 100 x10⁹/l is significant, and platelet infusions can be considered if there is evidence of bleeding (low platelets can occur outside HELLP and needs to be differentiated).

**Liver function tests**

The origins of the liver involvement are thought to be due to vasoconstriction of the blood vessels and damage to the cell linings within the liver. It is important that liver damage is excluded as bleeding in the liver capsule can cause it to rupture with life threatening results.

**Aspartate Transaminase (AST). (Normal level: 11 – 30 iu/l)** This enzyme is involved in the metabolism of the cells. It is found in high concentrations in the liver, heart, muscle, kidneys, red blood cells and pancreas. Therefore if any of these are damaged, the blood levels of this enzyme will increase. As this enzyme is found in several areas throughout the body, it is not a specific test for liver function.

**Alanine Transaminase (ALT) (Normal level: 6- 32 iu/l)** this enzyme is involved in cellular respiration and is found at low levels in the tissues. Normally both the AST and ALT remain unchanged in pregnancy.

**Total bilirubin. (Normal level: 3 – 14 µmmols)** This level does not normally rise in pre-eclampsia, but can rise in HELLP syndrome.

**Creatinine (Normal level: 55 – 73 µmmols) (many hospitals have completely stopped using uric acid levels)** Creatinine is a waste product of protein metabolism, and is excreted via the kidneys. In pre-eclampsia the renal function may be impaired due to the increased blood pressure, and therefore creatinine and is not excreted as well, and the levels can increase.
Appendix 2 Magnesium Sulphate Prompt Card. Change 20 mins to five to 15 mins

**Loading dose:** 4 g magnesium sulphate over 20 minutes

- Draw up 20ml from pre diluted vial of magnesium sulphate 20% injection solution.
- Infuse the 20ml (4g) over 20 minutes therefore set the infusion rate for 60ml/hr for 20mins.

**Maintenance dose:** 1g/hour

- In a second syringe draw up the remaining 30 ml of magnesium sulphate solution
- Infuse at a rate of rate to 5ml/hour (1g/hour) after administration of the loading dose

**Recurrent seizures while on magnesium sulphate:**

- Seek immediate senior obstetric and anaesthetic help.
- Take blood for serum magnesium levels.

**MONITOR FOR POSSIBLE SIGNS OF MAGNESIUM TOXICITY. IF IMPAIRED BREATHING, ARRHYTHMIAS, BRADYCARDIA, LOW BP, SLEEPINESS, DECREASED/ABSENT REFLEXES**

**STOP INFUSION – CALL FOR HELP**
Appendix 3 Patient Monitoring During Magnesium Sulphate Infusion

CHECK HOURLY

- Presence of deep tendon reflexes:
  - No epidural use patella jerk
  - With epidural: use biceps or pronator jerk (i.e. elbow)
- Respiratory rate
- Oxygen saturation (SaO₂)

Suspect toxicity if:
- Deep tendon reflexes absent
- Respiratory rate <12/min

Action required if toxicity suspected:
- Stop MgSO₄ infusion.
- Commence electrocardiograph monitoring.
- Send blood for serum magnesium (Mg) levels urgently.
- DO NOT restart MgSO₄ infusion until reflexes have returned, or when Mg level known to be at or below therapeutic range.

Serum Mg levels should also be requested if any of the following are present:
  - Oliguria < 80 ml over 4hrs
  - Creatinine > 150 mmol/l
  - Urea > 10 mmol/l
  - ALT > 250 iu/l
  - Recurrent seizures (take sample prior to MgSO₄ bolus)

### Toxicity Potential of Serum Magnesium Levels

<table>
<thead>
<tr>
<th>Serum Mg Levels</th>
<th>Potential Effect</th>
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<tbody>
<tr>
<td>2-4 mmol/l</td>
<td>Therapeutic range</td>
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<tr>
<td>5 mmol/l</td>
<td>Loss of deep tendon reflexes, weakness, nausea, feeling of warmth, flushing, double vision, slurred speech</td>
</tr>
<tr>
<td>6-7.5 mmol/l</td>
<td>Muscle paralysis, respiratory arrest</td>
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<tr>
<td>&gt;12 mmol/l</td>
<td>Cardiac arrest</td>
</tr>
</tbody>
</table>

**Actions if serum magnesium levels are >4 mmol/l or urine output <80ml in 4 hours:**
- Reduce infusion rate to 1.5 ml/hr
- If the level is greater than six – stop the infusion
  - Send blood for creatinine, U&Es and serum Mg levels
  - Repeat bloods 4-hrly if oliguria persists
  - Check reflexes every 30 minutes

**Action required in case of cardio respiratory arrest**

Call 2222 stating **Maternal Cardiac arrest**
- Commence cardio-pulmonary resuscitation (CPR) remember left lateral tilt for antenatal patient
- Stop MgSO₄ infusion
- **Administer 10ml 10% Calcium Gluconate IV**
- Send serum Mg level urgent