

## MATERNITY GUIDELINES

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### Hypertension in pregnancy

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## 1. Assessment and management of gestational hypertension

No significant proteinuria (PCR < 30mg/mmol)

	Degree of hypertension	
	<b><u>Hypertension:</u></b>  Blood pressure of 140/90–159/109 mmHg	<b><u>Severe hypertension:</u></b>  Blood pressure of 160/110 mmHg or more
<b>Admission to hospital</b>	Do not routinely admit to hospital	Admit, but if BP falls below 160/110 mmHg then manage as for hypertension
<b>Antihypertensive pharmacological treatment</b>	Offer pharmacological treatment if BP remains above 140/90 mmHg	Offer pharmacological treatment to all women
<b>Target blood pressure once on antihypertensive treatment</b>	Aim for BP of 135/85 mmHg or less	Aim for BP of 135/85 mmHg or less
<b>Blood pressure measurement</b>	Once or twice a week (depending on BP) until BP is 135/85 mmHg or less	Every 15–30 minutes until BP is less than 160/110 mmHg
<b>Dipstick proteinuria testing</b>	Once or twice a week (with BP measurement)	Daily while admitted

<b>Blood tests</b>	Measure full blood count, liver function and renal function at presentation and then weekly	Measure full blood count, liver function and renal function at presentation and then weekly
<b>Fetal assessment</b>	<p>Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2-4 weeks, if clinically indicated</p> <p>Carry out a CTG only if clinically indicated</p>	<p>Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 weeks, if severe hypertension persists</p> <p>Carry out a CTG at diagnosis and then only if clinically indicated</p>

## 2. Treatment

- First line: **Labetalol** (The only licenced hypertensive medication for pregnancy)
- Second line: **Nifedipine**
- Third line: **Methyldopa**

Base the choice on any pre-existing treatment, side effect profiles, risks (including fetal effects) and the woman's preference.

## 3. Timing of birth

Do not offer planned birth before 37 weeks gestation for patients with gestational hypertension whose blood pressure is below 160/110 mmHg unless there are other medical indications.

## 4. Postnatal monitoring and treatment

- Measure BP daily for the first 2 days after birth
- At least once between day 3 and day 5 after delivery
- Continue antihypertensive treatment if required
- Change Methyldopa to an alternative treatment within 2 days post delivery
- Reduce treatment if BP falls below 130/80 mmHg

**For women with gestational hypertension who did not require antihypertensive treatment and have given birth, start treatment if their BP is 150/100 mmHg or higher.**

An individual care plan must be documented with the postnatal notes prior to discharge home. This should include:

- Frequency of BP monitoring
- Threshold for reducing or stopping treatment
- Women who are taking anti-hypertensives must have a medical review with their GP two weeks after transfer home
- All women must have a BP check at 6-8 weeks post delivery

**Assessment and management of pre-eclampsia (PET)**

- If a dipstick screen is positive (1+ or more), use protein: creatinine ratio for quantification.
- A level of **30mg/mmol** is suggestive of pre-eclampsia. However if there is still uncertainty about the diagnosis of PET, consider retesting on a new sample alongside a clinical review. There are large variations in protein excretion throughout the day.
- Do not use first morning void to quantify as there is some evidence that this leads to lower diagnostic accuracy.

	<b>Degree of hypertension</b>	
	<b><u>Hypertension:</u></b>  <b>Blood pressure of 140/90–159/109 mmHg</b>	<b><u>Severe hypertension:</u></b>  <b>Blood pressure of 160/110 mmHg or more</b>
<b>Admission to hospital</b>	Admit if any clinical concerns for the wellbeing of the woman or baby	Admit, but if BP falls below 160/110 mmHg then manage as for hypertension
<b>Antihypertensive pharmacological treatment</b>	Offer treatment if BP remains above 140/90 mmHg	Offer treatment to all women

<p style="text-align: center;"><b>Target blood pressure once on antihypertensive treatment</b></p>	<p>Aim for BP of 135/85 mmHg or less</p>	<p>Aim for BP of 135/85 mmHg or less</p>
<p style="text-align: center;"><b>Blood pressure measurement</b></p>	<p>At least every 48 hours, and more frequently if the woman is admitted to hospital (4-6hrly)</p>	<p>Every 15–30 minutes until BP is less than 160/110 mmHg, then at least 4-6 hrly while the woman is an inpatient, depending on clinical circumstances</p>
<p style="text-align: center;"><b>Dipstick proteinuria testing</b></p>	<p>Only repeat if clinically indicated, for example, if new symptoms and signs develop or if there is uncertainty over diagnosis</p>	<p>Only repeat if clinically indicated, for example, if new symptoms and signs develop or if there is uncertainty over diagnosis</p>
<p style="text-align: center;"><b>Blood tests</b></p>	<p>Measure full blood count, liver function and renal function twice a week</p>	<p>Measure full blood count, liver function and renal function 3 times a week</p>
<p style="text-align: center;"><b>Fetal assessment</b></p>	<p>Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2-4 weeks</p> <p>Carry out a CTG at diagnosis and at least daily if remains an inpatient.</p>	<p>Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 weeks</p> <p>Carry out a CTG at diagnosis and at least daily if remains an inpatient or more often if clinically indicated.</p>

**PREP-S**

Consider using PREP-S validated prediction model in pregnancies up to 34 weeks to help guide decisions about the most appropriate place of care and threshold for intervention. However it does not predict the outcomes for babies.

<https://www.evidencio.com/models/show/1038>

**5. Treatment**

- First line: **Labetalol** (The only licenced hypertensive medication for pregnancy)
- Second line: **Nifedipine**
- Third line: **Methyldopa**

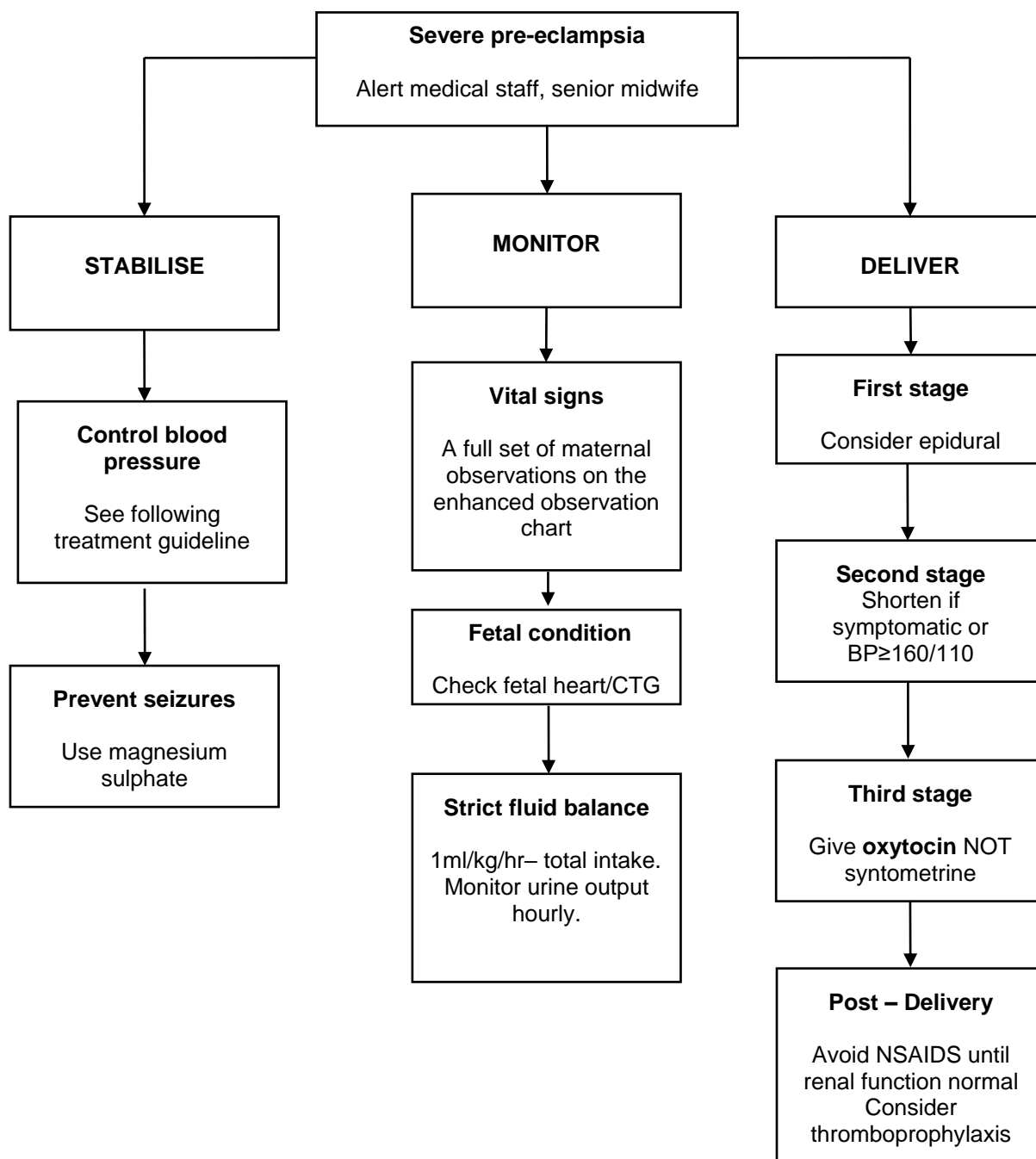
Base the choice on any pre-existing treatment, side effect profiles, risks (including fetal effects) and the woman’s preference.

**6. Timing of birth**

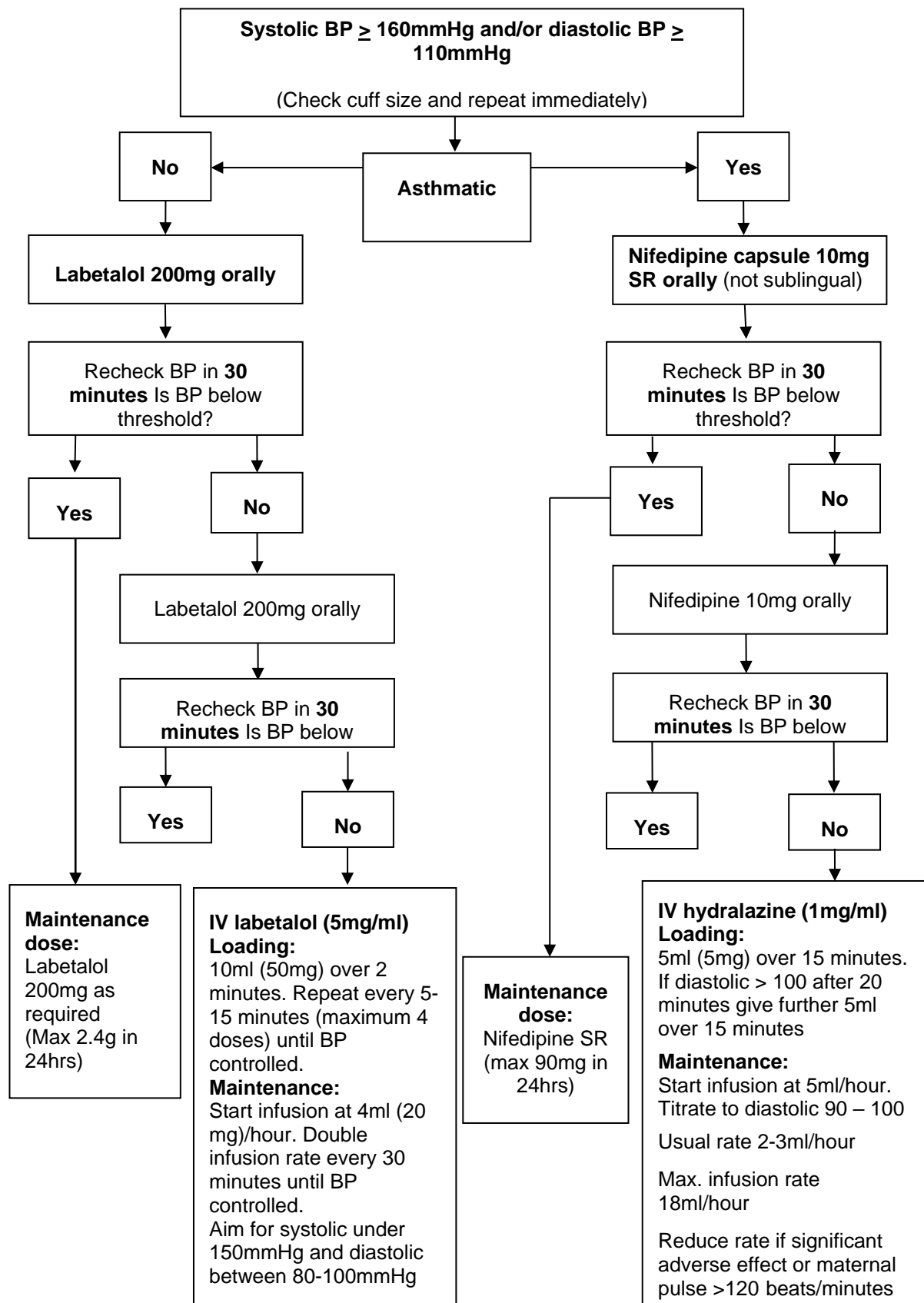
Mode of delivery will depend upon fetal presentation, wellbeing, gestational age and severity of hypertensive disease. Decision for delivery is to be made by a consultant obstetrician.

Weeks of pregnancy	Timing of birth
<b>Before 34 weeks</b>	Continue surveillance unless there are indications for planned early birth such as inability to control maternal blood pressure / progressive deterioration in blood tests / eclampsia / abnormal USS or CTG. Offer magnesium sulphate and a course of antenatal corticosteroids
<b>From 34 to 36 <sup>+6</sup> weeks</b>	Continue surveillance unless there are indications (as above) for planned early birth.
<b>37 weeks onwards</b>	Initiate birth within 24–48 hours.

**7. Management of Severe PET**



**Treatment of severe hypertension**





### Hydralazine

Use only if Labetalol and Nifedipine are contraindicated or fail to control BP.

**All anti-hypertensives have a cumulative effect (peaking at 30 min) and all act synergistically with magnesium sulphate to lower blood pressure.**

### Fluid balance

It is essential that fluid balance be closely monitored

- Insert indwelling Foley catheter and assess fluid output at hourly intervals.
- Limit maintenance fluids to 1ml/kg/hr unless there are ongoing fluid losses.
- If oliguria persists a plan should be made by the consultant obstetrician and anaesthetist on duty on further management seeking further medical advice if indicated.
- Use concentrated solutions of infused drugs where possible, such as 40iu of oxytocin made up to 40ml with normal saline and infused at 10ml/hour

### Observations

- Use enhanced observation chart to record clinical condition.
- Hourly recording of BP, PR, RR, SpO<sub>2</sub> and urine output as a minimum.
- CVP measurements if appropriate.
- Hourly reflexes on MgSO<sub>4</sub>.
- If requiring O<sub>2</sub> to maintain normal saturations assess for pulmonary oedema and consider CXR.
- 4 hourly temperature

## **8. Magnesium Sulphate (MgSO<sub>4</sub>)**

The use of MgSO<sub>4</sub> for primary prevention of seizures or recurrent seizures following an eclamptic fit.

### Loading dose

#### **MgSO<sub>4</sub> 4g as a SLOW BOLUS over 15 minutes**

- Draw up 8ml of 50% MgSO<sub>4</sub> solution (4g) followed by 12ml of 0.9% saline into a 50ml syringe
- Mix well
- This will give a total volume of 20ml
- Place the syringe in a syringe driver and run it at 80ml/hr
- The IV infusion will then run over 15 minutes.

### **Maintenance dose**

#### **MgSO<sub>4</sub> at 1g/hour**

- Draw up 10 ml of 50% Magnesium Sulphate solution (5g) followed by 40 ml of 0.9% saline into a 50 ml syringe.
- This will give a total volume of 50 ml.
- Place the syringe into a syringe driver and run at 10 ml/hr.

Continue for up to 24 hours post-delivery or post seizure, whichever is later.

### **Recurrent seizures while on Magnesium Sulphate**

#### **Give a further dose of 2-4g IV over 5-15 mins.**

- Seek immediate senior help.
- Draw up 4 ml of 50% Magnesium Sulphate solution (2g) followed by 6 ml 0.9% saline into a 10 ml syringe.
- This will give a total volume of 10ml.
- Give as an IV bolus over 5 minutes.
- If possible take blood for magnesium level prior to giving the bolus dose.
- If the woman is over 70kg, draw up 4g (8ml) in 12mls ml of 0.9% saline. (Total 20 ml).

### **Monitoring**

- The patellar reflex and oxygen saturation levels should be monitored hourly whilst MgSO<sub>4</sub> is being administered to exclude signs of toxicity.
- Beware of the cardiac effects of MgSO<sub>4</sub>, which may include hypotension and arrhythmias. If concerned, consider ECG.

### **Toxicity**

- Loss of reflexes, weakness, nausea, feeling of warmth, flushing, double vision, slurred speech and drowsiness.
- Muscle paralysis
- Respiratory arrest.
- Cardiac arrest.

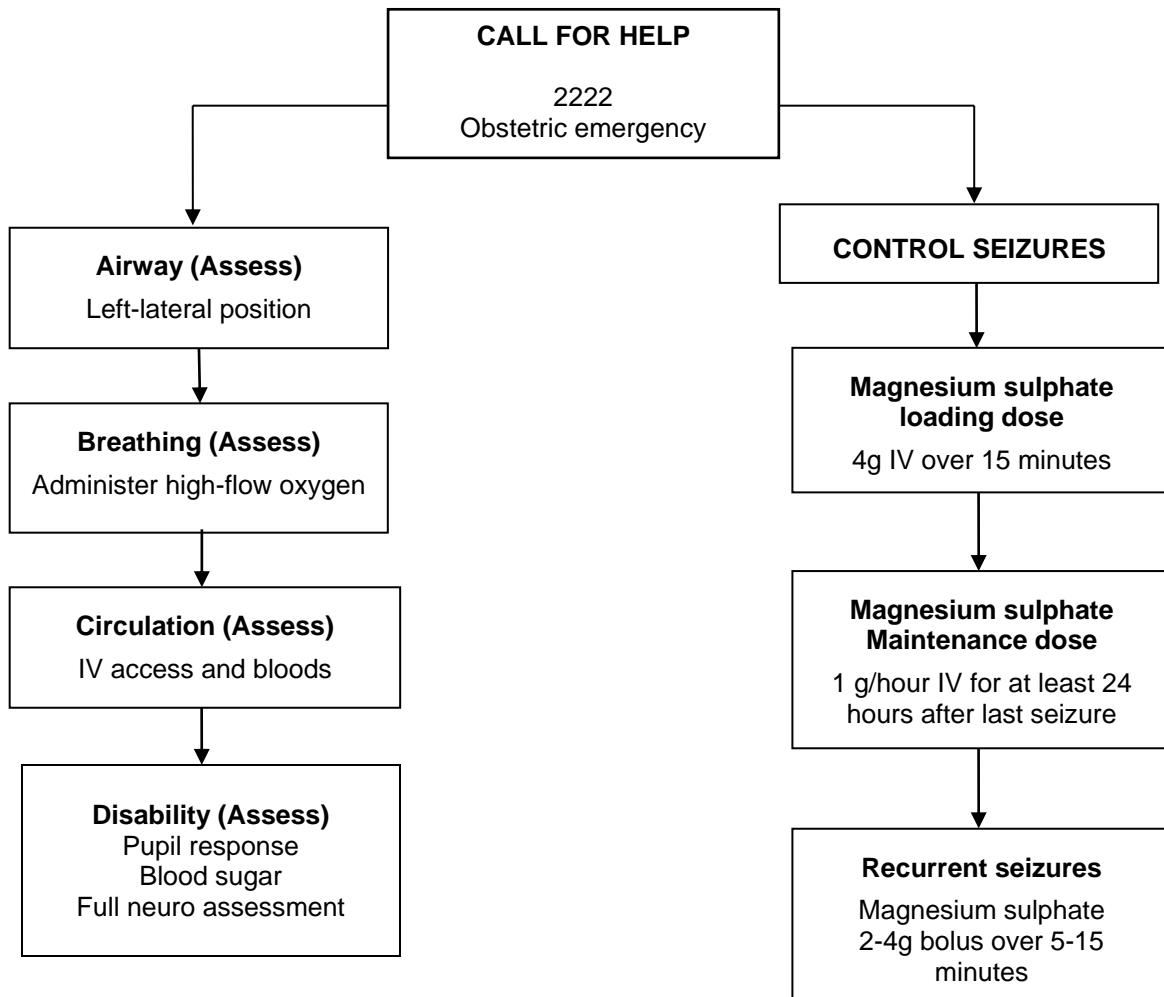
Levels are not indicated unless severe oliguria (less than 10 ml/hr) for 2 consecutive hours or loss of patellar reflex or respiratory depression. The first warning of impending toxicity in the mother is loss of the patellar reflex. The plasma concentration will be between 3.5 and 5mmol/L at this point. Respiratory paralysis occurs at 5.0 to 6.5 mmol/L. Cardiac conduction is altered with plasma concentrations greater than 7.5 mmol/L and cardiac arrest can be expected when the concentrations of magnesium exceeds 12.5 mmol/L.

### **Overdose**

Overdose is treated with 10 ml of 10% Calcium Gluconate IV over 10 minutes.

## 9. Management of Seizures

**CALL FOR HELP** – via emergency buzzer and instruct first in attendance to call **2222** and request “**Emergency Obstetric Team**”



**Complete the eclampsia proforma (appendix 1).**

### Indications for transfer to ITU following delivery

- Uncontrolled convulsions
- Unconscious patient
- Adult respiratory distress syndrome.
- DIC
- Renal failure not responding to normal guidelines following consultation with renal physicians
- Arterial line

## **10. Postnatal monitoring and treatment**

- Measure BP 4-6 hourly once transferred to postnatal ward.
- To remain an inpatient for at least 3 days and repeat at least one set of PET bloods within this time.
- Measure BP at least once between day 3 and day 5. If abnormal, repeat BP on alternative days until BP is within normal limits.
- Reduce antihypertensive treatment if BP falls below 130/80 mmHg

**For women with PET who did not require antihypertensive treatment and have given birth, start treatment if their BP is 150/100 mmHg or higher.**

An individual care plan must be documented within the postnatal notes prior to discharge home. This should include:

- Frequency of BP monitoring
- Threshold for reducing or stopping treatment
- Women who are taking antihypertensive's must have a medical review with their GP two weeks after transfer home
- All women must have their BP checked 6-8 weeks following delivery

## **Medication**

When treating women with anti-hypertensive medication during the postnatal period use medicines that are taken once daily whenever possible. The following medications are now recommended following delivery:

- **Enalapril**

For women of black African or Caribbean origin:

- **Nifedipine**
- **Amlodipine** – if this has previously been used to successfully control BP

If BP is not controlled with a single medication consider Nifedipine (or Amlodipine) and Enalapril. If this is not tolerated or is ineffective, consider either:

- Adding Atenolol or Labetalol
- Swapping 1 of the medicines already being used for Atenolol or Labetalol.

## **Future risks**

Women should be informed about their increased risk of developing pre-eclampsia in subsequent pregnancies and cardiovascular disease in later life.

Type of hypertension in current or previous pregnancy				
Risk of future cardiovascular disease	Any hypertension in pregnancy	Pre-eclampsia	Gestational hypertension	Chronic hypertension
<b>Major adverse cardiovascular event</b>	Risk increased (up to approx. 2 times)	Risk increased (approx. 1.5–3 times)	Risk increased (approx. 1.5–3 times)	Risk increased (approx. 1.7 times)
<b>Cardiovascular mortality</b>	Risk increased (up to approx. 2 times)	Risk increased (approx. 2 times)	no data	no data
<b>Stroke</b>	Risk increased (up to approx. 1.5 times)	Risk increased (approx. 2–3 times)	Risk may be increased	Risk increased (approx. 1.8 times)
<b>Hypertension</b>	Risk increased (approx. 2–4 times)	Risk increased (approx. 2–5 times)	Risk increased (approx. 2–4 times)	not applicable
<p>Risks described are overall estimates, summarised from risk ratios, odds ratios and hazard ratios. Increased risk is compared to the background risk in women who did not have hypertensive disorders during pregnancy</p>				

### **11. Aspirin - reducing the risk of PET**

Advise pregnant women at high risk of pre-eclampsia to take 150mg of aspirin daily from 12 weeks until the birth of the baby. Women at high risk are those with any of the following:

- Hypertensive disease during a previous pregnancy
- Chronic kidney disease
- Autoimmune disease such as SLE or APS.
- Type 1 or type 2 diabetes

Advise women with more than 1 moderate risk factor for pre-eclampsia to take 150mg of aspirin daily from 12 weeks until the birth of the baby. Factors indicating moderate risk are:

- First pregnancy
- Age 40 years or older
- Pregnancy interval of more than 10 years
- BMI of 35kg/m<sup>2</sup> or more at first visit
- Family history of pre-eclampsia
- Multi-fetal pregnancy

### **12. Management of chronic hypertension in pregnancy**

Please refer to NICE guideline 133 Hypertension in pregnancy: diagnosis and management. [www.nice.org.uk/guidance/ng133](http://www.nice.org.uk/guidance/ng133).

### **13. Record Keeping**

It is expected that every episode of care be recorded clearly, in chronological order and as contemporaneously as possible by all healthcare professionals as per Hospital Trust Policy. This is in keeping with standards set by professional colleges, i.e. NMC and RCOG. All entries must have the **date and time** together with **signature and printed name**.

It is the responsibility of the lead clinician to ensure there is a documented and up-to-date management plan in the patient records. An Enhanced Observation chart **MUST** be used.

### Appendix 1: Eclampsia proforma

Date:

Time of seizure:

Duration of seizure:

Witness to seizure:

Surname:  
 First name:  
 Hospital Number:  
 NHS Number:  
 DOB:

*Affix patient label here*

Team Member	Name	Time called	Time arrived
On-call obstetric consultant			
Duty obstetric registrar			
Duty obstetric SHO			
On-call anaesthetic consultant			
Duty anaesthetic registrar			
Midwife			
Midwife			
Midwife			
Other:			

Eclampsia Resuscitation	Time
2222 obstetric emergency team	
Get Eclampsia box	
Head bed down, oxygen 10-15l/min, left lateral	
Assess airway, breathing, circulation	
First large bore cannula	
FBC, U&E, LFT, uric acid, coagulation, G&S	
Second large bore cannula	
Observations commenced on ITU chart Minimum requirement of hourly BP, PR, RR, SaO2, urine output and reflexes. Temperature 4 hourly.	
Magnesium sulphate loading dose 4g over 5 min Magnesium sulphate maintenance dose 1g/h Recurrent seizure and need for second bolus of MgSo4	
Catheter and urometer	
Antihypertensive required	Yes <input type="checkbox"/> No <input type="checkbox"/>
Fluid restricted 1ml/kg/h Monitor fluid balance	
Continuous electronic fetal monitoring	Yes <input type="checkbox"/> No <input type="checkbox"/>

**STABILISE THE MOTHER BEFORE DELIVERY  
 AVOID ERGOMETRINE  
 REGULAR SENIOR REVIEW  
 COMPLETE INCIDENT FORM**

**Monitoring Audit**

**Auditable standards:**

Use of first line anti-hypertensive (labetolol).  
 Adherence to strict fluid balance in severe PET.  
 Correct use of MgSO<sub>4</sub>.  
 Timing of delivery.

Please refer to audit tool, location: 'Maternity on cl2-file11', Guidelines

**Reports to:**

Clinical Effectiveness Committee – responsible for action plan and implementation of recommendations from audit  
 Clinical Governance & Risk Management Committee

**Frequency of audit:**

Annual - severe preeclampsia  
 Continuous - eclampsia

**Responsible person:**

Senior CDS midwife / SHO

**Cross references**

Guideline development within the maternity services  
 Intravenous Drug Administration Policy  
 Policy for the Safe and Secure Handling of Medicines  
 Maternity Hand Held Notes, Hospital Records and Record Keeping

**References:**

National Institute for Health and Care Excellence (NICE). Hypertension in pregnancy: diagnosis and management. Clinical guideline 133. London. June 2019.

<b>Author</b>	Guideline Committee		
<b>Work Address</b>	Maternity Unit, Derriford Hospital, Plymouth, Devon, PL6 8DH		
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<b>Changes</b>	PREP-S prediction tool included. Aspirin information added. Postnatal medication. Future risks added. Letter to GP removed.		
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