# Trust Guideline for the Management of Pre-Eclampsia and Hypertensive Disorders in Pregnancy

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| **For Use in:** | Maternity Services |
| **By:** | Obstetricians and Midwives |
| **For:** | Maternity health professionals |
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This guideline has been approved by the Maternity Guidelines Committee as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant guidance should be documented in the patient's case notes.

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| Version Number | Date of Update | Change Description | Author |
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| 16 | 22/11/2019 | Change of blood pressure treatment thresholds and criteria for admission<br>Change of fluid management<br>Introduction of PlGF testing. | Victoria Lake, Charles Bircher Georgina Clark |
| 17 | 02/03/2021 | Addition of management of proteinuria in a normotensive woman. | Victoria Lake, Charles Bircher Georgina Clark |
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## Quick reference guideline/s

In order for the reader to find the relevant section within this large guidance the relevant sections are (please click to go directly to the correct page):



## Appendices

## Objective

This guideline is written to aid health professionals in the management of women who are:

1. At risk in the antenatal period of developing hypertension in pregnancy.
2. Women with pre-existing chronic hypertension.
3. Women who develop gestational hypertension.
4. Women who develop pre-eclampsia.
5. Women who develop severe pre-eclampsia and eclampsia.

The guidance encompasses the principles within the NICE clinical guidance (NG133) hypertension in pregnancy: diagnosis and management, and NICE Quality Standard number 35 hypertension in pregnancy.

## Definitions used in this guidance

### Chronic hypertension:

Hypertension present at booking visit or before 20 weeks, or that is being treated at time of referral to maternity services. Hypertension can be primary (e.g. essential) or secondary (e.g. renal disease, phaeochromocytoma, coarctation of the aorta, Cushing's syndrome, Conn's syndrome) in aetiology.

### Degrees of hypertension

- **Hypertension**: Diastolic blood pressure 90–109 mmHg, systolic blood pressure 140–159 mmHg.
- **Severe hypertension**: Diastolic blood pressure ≥ 110 mmHg, systolic blood pressure ≥ 160 mmHg.

### Eclampsia:

Convulsive condition associated with pre-eclampsia.

### Gestational hypertension:

New hypertension presenting after 20 weeks without significant proteinuria.

### Pre-eclampsia:

New hypertension presenting after 20 weeks with significant proteinuria.

### Severe pre-eclampsia:

Pre-eclampsia with severe hypertension and/or with symptoms, and/or biochemical and/or haematological impairment.

**Significant proteinuria**:

Urinary protein:creatinine ratio >30mg/mmol or a validated 24 hour urine collection result showing >300mg of protein.

## Section 1: Reducing the risk of Hypertensive Disorders in Pregnancy

### What to do in women considered moderate to high risk for Pre-eclampsia

### Assessment for the need for aspirin 150mg once daily

At the first antenatal contact, which is usually with the community midwifery team – in all women assess risk factors for development of PET:

| **Moderate risk factors** | **High risk Factor** |
|---|---|
| First pregnancy | Hypertensive disease during a previous pregnancy |
| Age ≥ 40 years | Chronic kidney disease |
| BMI ≥35 at first visit | Type 1 or type 2 diabetes |
| Family history of preeclampsia in a first degree relative | Autoimmune disease e.g. systemic lupus erythematosus or antiphospholipid syndrome |
| Pregnancy interval of more than 10 years | Chronic hypertension |
| Multiple pregnancy | Placental histology confirming placental dysfunction in a previous pregnancy (if available) |
| If **1 high risk factor or 2 (or more) moderate risk factors,** please advise women to take aspirin 150 mg at night from 12 weeks gestation until 36 weeks. | |

This can be bought over the counter (in the form of two 75mg tablets). A patient information leaflet is available on the NNUH internet site and NNUH intranet.

After the publication of Saving Babies Lives Care Bundle Version 2 (SBLCB V2), NNUH followed the recommendation to use 150mg. We accept the NICE hypertension in pregnancy guideline states 75-150mg.

At the maternity network Clinical Expert Group on 25/7/19 a consensus was reached that aspirin should be continues to 36 weeks or delivery, whichever is sooner. This is due to the theoretical concern about increased risk of complications from spinal anaesthesia, especially with patients also on low molecular weight heparin. SBLCB V2 recommends from the first to the third trimester, and is not explicit about the gestation to stop, so the NNUH guideline committee decided to follow the regional approach. This was also discussed with anaesthetics and haematology at the NNUH who also agreed.

## Section 2: Chronic Hypertension

**Definition:** Hypertension present at booking visit or before 20 weeks, or that is being treated at time of referral to maternity services.

### Antenatal Care
### Consultations

- Schedule appointments based on individual needs (weekly if poorly controlled, and 2-4 weekly if well controlled) – consider whether these women should be under the care of maternal or fetal medicine consultant.
- Stop ACE inhibitors and ARBs within 2 days of notification of pregnancy (increased risk of congenital abnormalities).
- Offer alternatives – labetalol, nifedipine or methyldopa would generally be considered safe for pregnancy.
- Complications to consider are superimposed pre-eclampsia, fetal growth restriction, placental abruption and severe hypertension.

### Treatment of chronic hypertension in pregnancy

- Low dietary sodium intake.
- Aim for target BP 135/85 mmHg.
- Do not offer treatment to lower diastolic BP < 80mmHg.
- If secondary hypertension – offer referral to a specialist in hypertensive disorders.
- Ensure on aspirin 150mg once daily from 12+0 until 36 weeks.
- Offer placental growth factor (PlGF) based testing once between 20 and 35 weeks gestation if suspicion of developing pre-eclampsia.

### Fetal Monitoring

- Serial growth scans as per fetal growth guideline.
- Ultrasound EFW should be plotted on customised growth (GROW) chart.

### Timing of birth

- In the absence of suspected fetal compromise and BP < 160/110 mmHg with/without antihypertensive treatment.
    - Do not offer birth < 37+0 weeks.
    - Once 37+0 weeks, then timing and mode of delivery should be agreed between woman and senior obstetrician.
- If refractory severe chronic hypertension before 37 weeks, then a senior obstetrician should assess need for delivery and need for corticosteroids.

## Intrapartum Care

- Continuous electronic fetal monitoring.
- Continue antihypertensive treatment.
- Measure BP hourly at a minimum.
- Avoid Syntometrine and ergometrine for management of third stage (use oxytocin 10 units IM).
- If BP ≥160/110 refer to section 5.

## Postnatal Care

- Aim to keep BP < 140/90mmHg – although in refractory patients, a BP <150/100mmHg may be a more appropriate target in the initial postnatal period.
- Measure BP daily for first 2 days after birth (with MEOWS score) and at least once 3-5 days after birth.
- Continue antenatal antihypertensive treatment.
- If methyldopa was used during pregnancy, stop within 2 days of birth and restart pre-pregnancy antihypertensive treatment.
- If woman breastfeeding, avoid diuretic antihypertensive.

## Follow up Care

After discharge from hospital (secondary care) the presumption is that follow up will be with general practitioner – however, the consultant may choose to review the patient.

## Information to GPs should be clearly communicated and included in the discharge paperwork.

As a minimum the woman should be advised:

- The long-term treatment should be reviewed by a doctor (Consultant or GP depending on individual management plan) at 2 weeks after birth.
- Medical review (consultant or GP depending on individual management plan) at 6-8 weeks.

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## Section 3: Gestational Hypertension

**Definition:** New hypertension developing after 20 weeks without significant proteinuria.

**Risk factors:**
Consider the below risk factors which may require additional assessment and/or follow up to assess for development of pre-eclampsia.

- Nulliparity **or** pregnancy interval >10 years.
- Age >40 years.
- Family history of pre-eclampsia.
- Previous history of gestational hypertension / pre-eclampsia.
- Multiple pregnancy.
- BMI ≥35 kg/$m^2$.
- Gestational age at presentation.
- Pre-existing renal / vascular disease.

### Antenatal care

### Point of Care Placental Growth Factor (POC PlGF) Testing

- PlGF testing should be used if there is concern regarding the development of superadded pre-eclampsia on the background of chronic or gestational hypertension.
- A high value (>100 pg/mL) has a high sensitivity (96%) and high negative predictive value (98%) for pre-eclampsia presenting before 37 weeks gestation and requiring delivery within 14 days (i.e. it rules out imminent pre-eclampsia).
- Women with high PlGF values whose blood pressure is adequately controlled can therefore be managed as outpatients.
- A PlGF value between 12 and 100 pg/mL does not confirm a diagnosis of pre-eclampsia and routine care (i.e. outpatient BP measurement and urinalysis can be instigated). If the patient has overt symptoms and signs of pre-eclampsia, she should be managed as an inpatient as usual.
- A PlGF value <12 pg/mL would strongly suggest a diagnosis of pre-eclampsia, but this is usually also evident on clinical grounds and/or routine laboratory testing.

**Labetalol** – Considered to be first line agent in antenatal management. Suggested regime of dosing is:

- Day 1: Labetalol 200mg BD.
- Day 2: If BP not controlled with the above → increase labetalol to 200mg TDS.

- Day 3: If BP not controlled, then consultant review is required – consider increasing labetalol to 300mg TDS.

If required the dose can be increased to a maximum of 800mg three times daily, increasing each dose by 100mg per day.

**Nifedipine** –

- Should be prescribed as MODIFIED RELEASE preparation.
- Second line agent/when oral labetalol unavailable or can be used in postnatal period when woman needs to change from methyldopa to another agent.
- Dosing regimen: 10mg BD; 20mg BD; 30mg BD; 40mg BD maximum dose.
- Nifedipine 10mg MR BD is equivalent to < 300mg labetalol TDS.

  Nifedipine 20mg MR BD is equivalent to 300mg labetalol TDS.

Conversion from higher doses of labetalol to nifedipine 30mg and 40 mg MR BD would usually require hospital admission.

**Fetal Monitoring Strategy for Gestational Hypertension**
SFH and EFW should be plotted on customised growth (GROW) chart.

*Gestational hypertension*

- **Auscultation:** offer fetal heart auscultation at every antenatal appointment.
- **Ultrasound**: perform for fetal growth, amniotic fluid and umbilical artery Doppler including pulsatility index at diagnosis. If initial ultrasound is normal, do not repeat unless maternal or fetal indications (if present, repeat every 2-4 weeks).
- **CTG**: only if clinically indicated (e.g. change of movements reported by the woman, vaginal bleeding, abdominal pain or deterioration in the woman's condition) and continuous monitoring required for labour.

*Severe hypertension (BP ≥ 160/110 mmHg) – Refer to section 5*

- **Auscultation:** offer fetal heart auscultation at every antenatal appointment.
- **Ultrasound**: perform growth scan to include amniotic fluid and umbilical artery Doppler including pulsatility index at time of diagnosis. If initial scan normal, do not repeat more than every 2 weeks unless severe hypertension persists.
- **CTG**: should be performed at diagnosis and repeated if any clinical indication develops. Continuous monitoring required for labour.

For those women with severe gestational hypertension an individualised care plan should be documented in the maternity record. Issues to consider:

- Timing and nature of future fetal monitoring.
- Fetal indications for birth.

- If, and when, corticosteroids should be used.
- When discussions with other professionals (anaesthetists and neonatal colleagues) should take place and what decisions should be made.

### Intrapartum Care

- Continuous electronic fetal monitoring.
- Continue antihypertensive treatment.
- Measure BP hourly at a minimum.
- Avoid Syntometrine and ergometrine for management of third stage (use oxytocin 10 units IM).

### Postnatal Care

- Continue antenatal antihypertensive treatment.
- If methyldopa was used during pregnancy, stop within 2 days of birth and switch to a suitable alternative.
- Measure BP daily for first 2 days after birth, and at least once between 3 and 5 days after birth, or as clinically indicated if antihypertensive treatment changed.
    - If no antenatal antihypertensive treatment, start antihypertensive treatment if BP ≥ 150/100 mmHg.
    - If BP falls to < 130/80 mmHg, reduce antihypertensive treatment.
    - If BP falls to < 140/90 mmHg, consider reducing antihypertensive treatment.
- On discharge, write a plan that includes:
    - Who will provide follow-up care.
    - Parameters for medical review if needed.
    - Frequency of BP monitoring.
    - If antihypertensive treatment is to be continued, offer medical review (generally by GP) 2 weeks after transfer to community care.

## Section 4: Pre-eclampsia

### Pre-eclampsia:

New hypertension presenting after 20 weeks with significant proteinuria.

### Antenatal Care

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**Assessment:**

- Use fullPIERS validation model to assess risks of pre-eclampsia and to guide place of care and thresholds for intervention. Note: this model does not predict outcomes for baby.
    - Accessible here: https://pre-empt.obgyn.ubc.ca/evidence/fullpiers
- Clinical concerns which require admission may include:
- Sustained severe hypertension.
- New and/or persistent:
    - Increase in creatinine (>90 µmol/L) or ALT (>70 IU/L).
    - Fall in platelet count (<150).
- Signs of impending eclampsia or pulmonary oedema.
- Suspected fetal compromise.

**Treatment**

**Labetalol** – Considered to be first line agent in antenatal management. Suggested regime of dosing is:

- Day 1: Labetalol 200mg BD.
- Day 2: If BP not controlled with the above → increase labetalol to 200mg TDS.
- Day 3: If BP not controlled, then consultant review is required – consider increasing labetalol to 300mg TDS.

If required the dose can be increased to a maximum of 800mg three times daily, increasing each dose by 100mg per day.

**Nifedipine**

- Should be prescribed as MODIFIED RELEASE preparation.
- Second line agent/when oral labetalol unavailable or can be used in postnatal period when woman needs to change from methyldopa to another agent.
- Dosing regimen: 10mg BD; 20mg BD; 30mg BD; 40mg BD maximum dose.
- Nifedipine 10mg MR BD is equivalent to < 300mg labetalol TDS.

  Nifedipine 20mg MR BD is equivalent to 300mg labetolol TDS.

Conversion from higher doses of labetalol to nifedipine 30mg and 40 mg MR BD would usually require hospital admission.

**Fetal Monitoring Strategy for Pre-eclampsia**
**Ultrasound**

- Fetal growth, amniotic fluid and umbilical artery Doppler should be performed after diagnosis. If initial ultrasound normal, repeat every 2 weeks.
- EFW plotted on customised GROW chart.

### Auscultation/CTG

- Offer fetal heart auscultation at every antenatal appointment.
- Carry out CTG at diagnosis.
- Repeat CTG if any: change in fetal movements, vaginal bleeding, abdominal pain, or deterioration in maternal condition.

### Care Plan

An individualised care plan should be documented in the maternity record. Issues to consider include:

1. Timing and nature of any future fetal monitoring.
2. Fetal indications for birth.
3. If, and when, corticosteroids should be given.
4. When discussions with neonatologists and anaesthetists should take place and what decisions should be made.

### Intrapartum Care

- Continuous electronic fetal monitoring.
- Continue antihypertensive treatment.
- Measure BP hourly at a minimum.
- Avoid Syntometrine and ergometrine for management of third stage (use oxytocin 10 units IM).
- Input / output chart.

### Postnatal Care of Women with Pre-eclampsia.

- If methyldopa was used to treat pre-eclampsia, stop within 2 days of birth and switch to a suitable alternative.
- **Bloods:** Repeat FBC, LFTs and U/Es 48-72 hours after birth, or sooner if clinically indicated. Do not repeat results if normal. If abnormal, continue to repeat bloods until within normal range.
- **Fluid balance:** Do not routinely measure fluid balance if creatinine within normal range after step-down from critical care level 2.

- Offer transfer to community midwifery care if BP < 150/100 mmHg, blood test results stable or improving & no symptoms of pre-eclampsia.
- **If no antenatal antihypertensive treatment measure BP**:
    - At least 4 times a day while inpatient.
    - At least once between 3 and 5 days after birth.
    - On alternate days until normal, if BP abnormal between day 3 and 5 days.
    - If BP ≥ 150/100 mmHg, start antihypertensive treatment.

- **If antenatal antihypertensive treatment:**
    - Continue antenatal antihypertensive treatment.
    - Reduce antihypertensive treatment if BP falls to < 130/80 mmHg; consider reducing if BP falls to < 140/90 mmHg.
    - Measure BP at least 4 times a day while an inpatient.
    - Measure BP every 1-2 days for up to 2 weeks after transferring to community care until woman is off treatment and has no hypertension.
- **Discharge Plan**:
    - Who will provide follow-up care.
    - Parameters for medical review if needed.
    - Frequency of BP monitoring.
    - If antihypertensive treatment is to be continued, offer medical review (generally by GP) 2 weeks after transfer to community care.
- **Breastfeeding**: Avoid diuretic treatment.
- Women whose pregnancies have been complicated by severe PET or eclampsia should be reviewed postnatally to discuss the events of the pregnancy and delivery. This should afford an opportunity to discuss preconception counselling, identification of modifiable risk factors and any preventative therapies.

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## Section 5: Acute Management of Severe Pre-Eclampsia and Eclampsia

### Measurement of blood pressure:

- Blood pressure should be measured using a manual sphygmomanometer and recorded to the nearest 2mmHg.
- A large BP cuff should be used when the upper arm circumference exceeds 33 cm.

### Diagnosis of Severe Pre-Eclampsia:

1. Absolute BP ≥160mmHg systolic or ≥110mmHg diastolic with significant proteinuria.
2. Absolute BP ≥140/90 with significant proteinuria and one of the following:
    a. Headaches, visual disturbance, dyspnoea, chest or epigastric pain.
    b. Clonus ≥ 3 beats.
    c. Platelets <100 x $10^9$ /lL or ALT or AST >70 u/L.
    d. Creatinine greater than 100 umol/L.
    e. Papilloedema.
3. Eclampsia – a seizure occurring in a patient with PET.
4. H.E.L.L.P. syndrome.
5. Clinical discretion should be used to include any other women who present with atypical symptoms.

### Principles of management:

**Stabilise the maternal condition by controlling blood pressure, prevent seizures, and then to deliver the baby by the safest route.**

**All the drugs needed to treat severe pre-eclampsia or eclampsia are in the emergency red box.**

### Immediate management of severe hypertension or severe pre-eclampsia

1. Transfer patient to the Delivery Suite to stay until at least 24 hours after delivery. Commence 1:1 care and HDU Chart.
2. Insert IV cannula into forearm vein with Hartmann's infusion at 80 mL/hour.
3. Indwelling urinary catheter for hourly urine measurements.
4. Initial maternal investigations:
    - Full blood count.
    - Urea and electrolytes.
    - Liver function tests.

- Group and save.
- **Clotting screen if platelets < 100 x $10^9$/L.**
- **Please note that urate testing is no longer recommended by NICE in the diagnosis of pre-eclampsia and the test has been removed from the 'PET Profile' on ICE.**

5. Give prophylactic antacid (ranitidine 150 mg 6-hourly, by mouth)
6. Notify:
    - Delivery Suite coordinator.
    - Duty consultant obstetrician.
    - Obstetric anaesthetist.
    - NICU.

**Care plan and communication**

- One-to-one care with a qualified midwife who will provide the continuity of care and report to the coordinating midwife.
- Care for women with severe pre-eclampsia or eclampsia on Delivery Suite will be coordinated by the consultant obstetrician, consultant anaesthetist and the senior midwife coordinator on duty/call.
- The woman will be reviewed by the multi-professional team at each ward round or more frequently depending on the clinical findings to provide an opportunity for clear lines of communication.
- Following each review, a plan of care will be clearly documented in the maternal notes.
- Any deterioration in the woman's condition must be immediately communicated to the consultant obstetrician, consultant anaesthetist and coordinator of midwives for DS in order to ensure appropriate care is given.
- The neonatologist and Neonatal Intensive care unit (NICU) will be made aware of the woman's condition, gestation, fetal wellbeing and any plans to induce labour/deliver the baby.
- The multi-professional team will ensure that the woman and her family are given the information required to make informed choices/give informed consent in relation to her care and that they are included in the decision making regarding the management of labour and delivery.

## Monitoring

1. Record BP and pulse every 15 minutes using a Datascope or Dinamap machine for a minimum of 4 hours until BP stabilized and then half hourly.
2. Treatment should be based on trends in BP.
3. If blood pressure is refractory to treatment, contact anaesthetist to consider an invasive arterial line.
4. Measure oxygen saturations continually and record hourly.

a. Administer oxygen if saturations fall below 95% on room air and immediately contact anaesthetist. Consider interstitial pulmonary oedema (fluid overload) or excess respiratory depressants.

5. Hourly urine output and proteinuria via indwelling catheter.
6. Detailed input/output recordings on megachart.
7. Temperature measured 4 hourly.
8. Routine PET bloods every 12-24 hours – or more frequently at discretion of consultant.
9. Consider CVP if oliguric or bleeding.

## Blood Pressure Control

Reduction of severe hypertension is mandatory to reduce the risk of a cerebrovascular accident.

**The aim of the anti-hypertensive treatment is to keep:**
**Diastolic blood pressure between 80 – 100 mmHg**
**<u>and</u> systolic blood pressure below 150 mmHg**

### First line therapy = Labetalol

**Second line therapy = Hydralazine** Also can be used first line when labetalol is contraindicated (asthma and cardiac failure) or in women who may be less responsive to labetalol such as women of Afro-Caribbean origin.

## Labetalol regimen

**Contraindicated in cardiac failure and asthma**

**Principles: <u>See Appendix 2</u>**

### Aim for BP of less than 150/100mmHg

1. If the woman can tolerate oral therapy, an initial 200mg oral dose can be given. This can be done immediately before venous access and so can achieve as quick a result as an initial intravenous dose. This should lead to a reduction in blood

pressure in about half an hour. A second 200mg oral dose can be given if needed in 30 minutes.

2. If there is no initial response to oral therapy or if it cannot be tolerated, BP control should be by repeated bolus of IV labetalol followed, if necessary, by a labetalol infusion.

3. Bolus infusion is 50mg (= 10mL of labetalol 5mg/mL) given over at least 1 minute. This should have an effect by 5 minutes and should be repeated if blood pressure has not been reduced. This can be repeated to a maximum dose of 200mg (four bolus doses). The pulse rate should remain over 60 beats per minute.

   **Labetalol is located in the red eclampsia box on the emergency trolley**

4. Following this a maintenance infusion of labetalol should be commenced. If required, an infusion of (neat) labetalol 5mg/mL at a rate of 4mL/hour via a syringe pump should be started. The infusion rate should be doubled every half-hour to a maximum of 32mL (160mg)/ hour until the blood pressure has normalised and then stabilized at an acceptable level. This level will vary between women.
5. Oral antihypertensive treatment should be considered when intravenous treatment has been discontinued.

## Hydralazine regimen:

### Principles:

1. Hydralazine may induce placental hypoperfusion in undelivered women, so before it is administered to lower blood pressure in the acute phase of treatment, volume expansion using a bolus dose of 500 mL Hartmanns is essential. Administer the Hartmanns over 20 minutes, then recheck the blood pressure before administering hydralazine. No prior volume expansion with Hartmanns is necessary before hydralazine administration if the patient has delivered.
2. Initial dose of hydralazine 5 mg IV slowly every 10 min until BP controlled (maximum dose 20 mg). The BP response to the administered hydralazine needs to be monitored by automated BP measurement, and confirmed by one or two measurements using a manual sphygmomanometer.
3. Maintenance IV infusion of hydralazine 50 mg in 50 mL saline via syringe pump starting at 5mlL/hour and titrating with MAP.
4. Reduce the dose if there are significant side effects or the maternal pulse > 120 bpm.
5. Caution should be used in patients with renal disease.

6. Oral antihypertensive treatment should be considered when intravenous treatment has been discontinued.

## Prevention of seizures – prophylactic anti-convulsant treatment:

1 in 200 cases of severe PET progress to eclampsia, therefore prophylactic anti-convulsant therapy is aimed at reducing the risk of this progression.

1. Loading dose of magnesium sulphate 4 g (20 mL of 20% solution) given slowly IV (over 10 min) via a syringe driver, only once the BP has been stabilised.
2. Maintenance infusion of magnesium sulphate at a set dose of 1 g/hour (5 mL/hour of 20% solution via syringe driver). This rate continued unless knee jerks abolished urine output less than 100 mL in 4 hours, or respiratory rate under 12 per min. when the infusion should be stopped.
3. Test reflexes and monitor respiratory rate hourly.
4. If toxicity is suspected (by absence of reflexes, respiratory rate under 12 or maternal confusion/altered conscious level), the infusion should be **stopped immediately** and consideration given to measuring levels. Adverse effects are seen at levels over 5mmol/L and levels over 6mmol/L may be dangerous.
5. **Antidote** to magnesium sulphate is 500 mg calcium chloride or calcium gluconate (5 mL of 10% solution) given IV over 5 min. This is available in pre-filled syringes kept on Delivery Suite.

## Control of an eclamptic seizure:

- Eclampsia is defined as generalised convulsions in any woman with signs and symptoms of pre-eclampsia, or in any woman who then presents with hypertension in pregnancy.
- Eclampsia is an absolute indication for delivery - but not until the condition of the mother has been stabilised.
- Remember, >40% of fits occur post-delivery, so vigilance is essential – although the disease will resolve spontaneously in all but a few cases.

Principles of management of eclamptic fits:

1. Place patient in the left lateral position and secure the airway.
2. Administer oxygen at 10 L/min.
3. Administer magnesium sulphate - give 4 g magnesium sulphate as per instructions for loading dose above. Recurrent seizures should be treated by a further bolus dose of 2 - 4g depending on the patient's weight; 2g if less than 70 kg and 4g if over 70Kg.
4. Use the Eclampsia proforma in the acute setting (appendix 3).

## Fluid Balance in severe PET and eclampsia

A balance needs to be made between risk of pulmonary oedema and under infusion predisposing to oliguria and renal complications.

**Objective is to maintain a minimum urine output of 100mLs/4 hours.**

**The principles of fluid management:**

1. Accurate recording of fluid balance (including delivery and post-partum).
2. Maintenance crystalloid infusion of Hartmann's 80 mL/hour (minus the volume of any infused drugs).
    - For women who require the post-partum syntocinon regimen, this can be safely administered by diluting 20 units of syntocinon in 50mL of 0.9% normal saline and delivering this through a syringe driver set at 25mL/hour.
3. Selective monitoring of CVP
    - Haemorrhage.
    - Oliguria.
    - Significant fall in platelet count.
    - Liver tenderness.
4. Selective colloid expansion
    - Oliguria and low CVP.
    - Prior to infusion of hydralazine.
    - If initial haematocrit > 35% (ie. haemoconcentrated) consider 500mL colloid.
    - Do **not** preload women with intravenous fluids prior to establishing epidural or combined spinal epidural analgesia.
5. Avoid potential nephrotoxics – especially Diclofenac or other NSAIDs.
6. Diuretics in pulmonary oedema (discuss with anaesthetist).

**Oliguria and CVP (see Appendix 1)**

Oliguria is relatively common in labouring pre-eclamptic patients and may represent a normal response to short-lived pre-renal causes. Oliguria is defined as <100 mL/4 hours.

Principles:

1. The anaesthetist will set up and supervise the CVP.
2. Subclavian line insertion is relatively contraindicated if the patient has a coagulopathy.
3. All readings to be taken at the mid axillary line angle with patient lying flat. Ensure left lateral tilt is maintained to avoid aorto-caval compression.

1. If platelet count is 80 - 100 x $10^9$/L, and the clotting screen is normal, regional anaesthesia is usually acceptable. In all other circumstances, please liaise closely with the obstetric anaesthetist.
2. Consider the administration of alfentanil 1.0 – 2.0 mg intravenously as part of the rapid sequence technique for laryngoscopy in an attempt to obtund the hypertensive response. A bolus dose of magnesium (40 mg/kg) can also be used for this purpose; this should be reduced to 30 mg/kg if the patient is already receiving magnesium. In cases of severe PET, magnesium and alfentanil can be used together.
3. **Do not give NSAIDs – this may worsen renal failure.**

## Continuing care

1. Patient should remain in the Delivery Suite and be fully monitored (including laboratory investigations) for at least 24 hours after delivery. Fluids should continue at 80mL/hour, if there is no evidence of pulmonary oedema.
2. Magnesium sulphate infusion should be continued for 24 hours after delivery.
3. Labetalol infusion should be continued as necessary to control BP. The decision for continuing anti-hypertensive treatment with oral therapy should be made by a consultant - who should also be responsible for the choice and dose of the agent used.
4. Consider the need for thromboprophylaxis. Apply anti-embolism stockings and commence prophylactic dose low molecular weight heparin, provided platelet count > 100.
5. If there are concerns about the patient's blood pressure or fluid management, or if her condition deteriorates, consider early referral to HDU/ITU.

**Trust Guideline for the Management of Pre-Eclampsia and Hypertensive Disorders in Pregnancy**

## Section 6: Hypertension in Pregnancy: Telephone Assessment

**When to use:**
Telephone assessment of new hypertension found by community midwife or GP. This flow chart is to be used by the triage team to decide if a patient needs to come to triage/MAU for further assessment. Also see MAU guideline (Trustdocs ID No: 11525)

**How to use:** Use diastolic or systolic figure that puts BP in higher risk category

## Trust Guideline for the Management of Pre-Eclampsia and Hypertensive Disorders in Pregnancy

## Section 7: Hypertension in Pregnancy: MAU Assessment

**When to use:**

This flow chart is for the use of the midwifery team in triage / MAU to assist in the diagnosis, investigations and treatment of women presenting to the unit with hypertensive problems. Also see MAU guideline (Trustdocs ID No: 11525).

**How to use:** Use diastolic or systolic figure that puts BP in higher risk category.

## Section 8 Proteinuria In a normotensive woman:

Proteinuria: Be aware that this can be a symptom of impending pre-eclampsia —if there are other symptoms of **pre-eclampsia**, arrange referral to MAU

Always ensure the specimen is a fresh, clean, midstream specimen of urine

**In the community:**
If there is 1+ protein on dipstick and either the woman has symptoms of a UTI, or the dipstick test is positive for nitrite or for both leucocyte and blood, make a working diagnosis of UTI.
Send a midstream specimen of urine (MSU) for culture and sensitivity and treat.

If 1+ protein on dipstick and no other symptoms of pre-eclampsia, reassess in 1 week: Advise the woman to seek immediate medical attention if she develops symptoms of pre-eclampsia in the intervening period.

If after 1 week there is persistent proteinuria 1 + send UPCR. If this the PCR is >30mg/mmol seek medical advice

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If there is 2+ protein or more on dipstick,refer to MAU (even if there is evidence of a possible UTI.)

**In the hospital:**
Manage as above:
It is not always necessary to refer to MAU, but ensure the patient is reviewed by a senior obstetrician who, after further assessment, will individualise their plan of care.

**Summary of development and consultation process undertaken before registration and dissemination**

The author listed above drafted this guideline on behalf of the Obstetric Guidelines Committee who have agreed the final content. During its development it was has been circulated for comment to: all members of the obstetric guideline committee

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# Trust Guideline for the Management of Pre-Eclampsia and Hypertensive Disorders in Pregnancy
# Appendix 1: Fluid balance in women with severe PET who have a CVP

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**Trust Guideline for the Management of Pre-Eclampsia and Hypertensive Disorders in Pregnancy**
**Appendix 2: Antihypertensive therapy in severe PET**

Recheck BP every 15 min

BP <150/100 mmHg **(Confirm with manual sphyg)**

Recheck BP After 5 min

BP ≥150/100 mmHg

Repeat labetalol 50 mg every 5 min (max. dose 200mg)

BP remains ≥150/100 mmHg Consider referral to HDU/ITU

| Eclampsia Proforma | | | | *Patient Identifier Label* |
|---|---|---|---|---|
| **Date of seizure** *dd/mm/yyyy* | | **Time or seizure** *24 hours clock* | | |
| **Consultant** | | **Duration of seizure** | | |

| **Person completing form (scribe)** | *Print name* | *Signature* | *Designation* | *Date dd/mm/yyyy* |
|---|---|---|---|---|
| | | | | |

| **Persons present at start of seizure** | *Print name* | *Designation* |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

| **Call for help** | *Tick when actioned* | *Time actioned as appropriate 24 hour clock* |
|---|---|---|
| Emergency bell activated | ☐ | |
| Help arrival and SBAR | ☐ | |
| Eclampsia box collected | ☐ | |
| 2222 call | ☐ | |
| Consultant Obstetrician Informed | ☐ | |
| **Airway** | *Tick when actioned* | *Time actioned as appropriate 24 hour clock* |
| Check airway/chin lift | ☐ | |
| Turn to left side | ☐ | |
| **Breathing** | *Tick when actioned* | *Time actioned as appropriate 24 hour clock* |
| Check breathing | ☐ | |
| Oxygen 10 litres/minute | ☐ | |
| **Circulation** | *Tick when actioned* | *Time actioned as appropriate 24 hour clock* |
| Insert x 2 16G cannula | ☐ | |
| Take bloods | ☐ | |
| FBC | ☐ | |
| GandS | ☐ | |
| Clotting | ☐ | |
| UandE/LFT | ☐ | |
| **Monitoring (initial observations)** | | |
| Manual BP mmHg | | |

| | |
|---|---|
| Pulse bpm | |
| Oxygen Sats % | |
| Resps per min | |

| **Eclampsia Proforma** | | | | |
|---|---|---|---|---|
| **Date** *dd/mm/yyyy* | | **Time** *24 hours clock* | | |
| **Consultant** | | | | |

| **Person completing form (scribe)** | *Print name* | *Signature* | *Designation* | *Date dd/mm/yyyy* |
|---|---|---|---|---|
| | | | | |

| **Treatment** | **Administration Time** *(24 hour clock)* | |
|---|---|---|
| **Anti Hypertensive Loading dose /bolus** Labetalol | 2 x 20mL ampoules Labetalol - draw up 10mLs into each 10mL syringe (4 x 10mL doses). 1x 10mL dose given over 1 minute. Repeat after 5 minutes if required. Max 4 doses. | |
| BP / *mmHg* | Labetalol (50mg) 10mL IV Bolus 1 | |
| BP / *mmHg* | Labetalol (50mg) 10mL IV Bolus 2 | |
| BP / *mmHg* | Labetalol (50mg) 10mL IV Bolus 3 | |
| BP / *mmHg* | Labetalol (50mg) 10mL IV Bolus 4 | |
| **Anti-Convulsant Loading dose** Magnesium Sulphate ($MgSO_4$) | From a 50 mL bottle of $MgSO_4$ 20%, draw up 20mLs in a 50mL syringe. Prime and connect manometer line. Load the syringe driver and set at 120mL/hr. Infusion time 10 minutes. | |
| $MgSO_4$ infusion commenced *tick* | Yes ☐ | |
| **Treatment** | **Administration Time** *24 hour clock* | |

| | | | |
|---|---|---|---|
| **Anti-Hypertensive maintenance dose** Labetalol | Draw up the contents 2 ampoules of Labetalol (200mg in 40mL) into a 50 mL syringe. Prime and connect manometer line. Load the syringe driver and commence at 4mL/hr.<br>Infusion rate should be doubled every 30 minutes to a max of 32mL/hr until BP stable as per guideline Trust Docs ID887 | | |
| Labetalol infusion commenced *tick* | Yes ☐ | | |
| **Anti-Convulsant maintenance dose** $MgSO_4$ | Draw up 50mLs of 20% $MgSO_4$ into a 50mL syringe.<br>Connect to a syringe drive and infuse at a rate of 5mL/hr. | | |
| $MgSO_4$ infusion commenced *tick* | Yes ☐ | | |
| Insert urinary catheter/send UPCR *tick* | Catheter ☐ UPCR ☐ | | |
| **Initial post seizure Observations** | **Time** *24 hour clock* | | |
| BP *mmHg*<br>Pulse *bpm* | Resps / min Temp Oxygen Sats % | | |
| Commence Mega Chart ASAP *tick* | Yes ☐ | | |
| Consider evaluation of fetal wellbeing | FHR bpm time *24 hour clock* | | |
| CTG performed *tick* | Yes ☐ No ☐ Categorisation | | |
| **Incident form** | *Tick as appropriate* | *Time actioned as appropriate 24 hour clock* | |
| Incident form completed | Yes ☐ No ☐ If yes – Datix reference No: | | |
| **Persons present during Incident** | *Name* | *Designation* | *Time of arrival 24 hour clock* |
| | | | |
| | | | |
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