The Shrewsbury and Telford Hospital NHS Trust

Hypertensive Disorders of Pregnancy in the Antenatal, Intrapartum and Postnatal Period (Including Management of Severe Pre-Eclampsia and Eclampsia)

Version 3.7

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For triennial review

Version	Implementation Date	History	Ratified By	Full Review Date
1	10th December 2012	New Guideline	MGG Maternity Governance	Dec 2015
1.1	3rd June 2014	Reviewed against NICE QS35 minor revisions	MGG	Dec 2015
1.2	18th September 2014	Minor changes to Appendix 1 due reconfiguration	GC Authorised	Dec 2015
1.3	6th October 2015	Full review date extended as reflects current national guidance. NICE due full review September 2016.	Extraordinary Approval	Oct 2016
1.4	11th January 2016	Updated due to introduction of Triage	GC authorised	Oct 2016
1.5	October 2018	Reflects current practice. Guideline under review		April 2019
1.6	7th February 2019	Addition of 5.4 Intrapartum management: using nifedipine for a one off dose in preference to labetalol.	MGG Maternity Governance	April 2019
2	July 2019	• Full Review. • Addition of appendix 1 and 2 Management of Pre-Eclampsia-Severe.	MGG Maternity Governance	July 2020

Version	Implementation Date	History	Ratified By	Full Review Date
		• Removal of reference to Postnatal Pre Eclampsia Clinic, whilst a robust process is agreed. • Addition of Appendix 3 Magnesium Sulphate Regimen • Awaiting completion of NICE Benchmarking Tool prior to further update of local guidance		
3	October 2022	• Full revision in line with NICE guideline	Maternity Governance	October 2027
3.1	November 2022	• Update to fetal ultrasound surveillance to include UtAD	Maternity Governance	October 2027
3.2	November 2022	• Addition of appendix 11		October 2025
3.3	19th January 2024	• Updated for clarification on methods of monitoring BP from SBL and NICE recommendations. • Added gender statement	Maternity Governance	October 2025
3.4	31st January 2024	• Revisions in line with SBLCB version 3 • Digital BP monitoring at booking National Guidance	National Guidance Maternity Governance	October 2025
3.5	15th May 2025	• Revision of gestational week curtailment of aspirin in line with RCOG Small-for-Gestational-Age Fetus and a Growth Restricted Fetus, Investigation and Care (Green-top Guideline No. 31) 2024	National Guidance Maternity Governance	October 2025
3.6	15th July 2025	• Removal of appendix 11 (audit tool)	Louise Weaver – Clinical Audit Facilitator	October 2025
3.7	3rd November 2025	• Minor amendment to reflect new clinical referral process	Maternity Governance	October 2025 (extension requested)

1.0 Introduction

In this guideline we use the terms 'woman' or 'mother' throughout. These should be taken to include people who do not identify as women but are pregnant or have given birth.

This guideline is based on NICE Hypertension in Pregnancy (2019). The guidance will be used for the management of women who have hypertension and/or proteinuria during their pregnancy in the antenatal, intrapartum and postnatal period. This guideline will be read in conjunction with Early Warning Score – Recognition of the Severely Ill Pregnant Woman (039)

Women who are on Delivery Suite who have been diagnosed with Eclampsia and/or HELLP syndrome will be managed as per Delivery Suite guideline: Eclampsia (038)

- Most hypertensive disorders that occur during pregnancy develop for the first time in the second half of pregnancy (>20weeks).
- New hypertension can occur without significant proteinuria (gestational hypertension) or with significant proteinuria (pre-eclampsia).
- Pre-eclampsia can also occur in women who already have chronic hypertension (superimposed pre-eclampsia)
- Whilst hypertension and proteinuria often present at the same time, proteinuria may be evident in some women before hypertension occurs. If proteinuria is present, without symptoms of a UTI, Health Care Professionals should consider the possibility of pre-eclampsia. The woman should remain under surveillance until this is excluded.
- Hypertensive disorders during pregnancy carry risks for the woman and are among the leading cause of maternal death in the UK.
- Hypertensive disorders also carry risks for the baby in terms of higher rates of perinatal mortality, pre-term birth and low birth weight. (NICE 2010)

2.0 Aim

To provide evidence based care pathways for Health Care Professionals (HCP) when managing women with hypertensive disorders of pregnancy.

3.0 Objectives

Initial risk assessment will be carried out at booking and the appropriate care pathway followed.

When new risks are identified during routine antenatal, intrapartum and postnatal care the appropriate care pathway will be identified and followed.

4.0 Definitions & Abbreviations

4.1 Chronic hypertension

Hypertension present at booking visit or before 20 weeks of gestation, or that is being treated at time of referral to maternity services. Can be primary or secondary in aetiology.

4.2 Hypertension

Blood pressure of ≥140 mmHg systolic or ≥90 mmHg diastolic.

4.3 Severe hypertension

Blood pressure of ≥160 mmHg systolic or ≥110 mmHg diastolic.

4.4 Eclampsia

Convulsive condition associated with pre-eclampsia.

4.5 Gestational Hypertension

New hypertension presenting after 20 weeks of pregnancy without significant proteinuria.

4.6 Pre-eclampsia

New onset of hypertension (>140 mmHg systolic or >90 mmHg diastolic) after 20 weeks of pregnancy **and** the coexistence of one or more of the following new onset conditions:

- **proteinuria** (urine protein:creatinine ratio of ≥30 mg/mmol **or** albumin:creatinine ratio of ≥8 mg/mmol **or** ≥ 1g/L [2+] on dipstick testing) **OR**
- **other maternal organ dysfunction:**
  - renal insufficiency (serum creatinine ≥90 micromol/L)
  - liver involvement (elevated transaminases [ALT>40 iu/L] with or without right upper quadrant or epigastric 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 <150x10^9/L), disseminated intravascular coagulation (DIC) or haemolysis.
- **uteroplacental dysfunction** such as fetal growth restriction, abnormal umbilical artery doppler waveform analysis or stillbirth.

4.7 Severe pre-eclampsia
Pre-eclampsia with severe hypertension that does not respond to treatment or is associated with ongoing or recurring severe headaches, visual scotomata, nausea or vomiting, epigastric pain, oliguria and severe hypertension, as well as progressive deterioration in laboratory blood tests such as rising creatinine or liver transaminases or falling platelet count or failure of fetal growth or abnormal doppler findings.

4.8 HELLP syndrome
Haemolysis, Elevated Liver enzymes and Low Platelet count.

4.9 Appropriately trained health care professional for the management of women with mild hypertension in the antenatal period may be the midwife.

4.10 Appropriately trained health care professional for the management of women with moderate or severe hypertension will be the Obstetric tier 2 or Consultant. Midwives will contribute to monitor the condition.

4.11 HCP Health Care Professionals

4.12 PCR Protein Creatinine Ratio

4.13 MIS Maternity Information System

4.14 DAU Day Assessment Unit

4.15 ACE inhibitor Angiotensin-Converting Enzyme inhibitor

4.16 ARBs Angiotensin Receptor Blockers

4.17 PlGF Placental Growth Factor

5.0 Process

5.1 Reducing the risk of hypertensive disorders in pregnancy

5.1.1 Aspirin

At the initial antenatal booking consultation women will be assessed as follows for **risk factors for pre-eclampsia**.

Moderate	High
• First ongoing pregnancy • Age ≥ 40 years • Pregnancy interval > 10 years • BMI ≥ 35 Kg/m^2 at first visit • Family history of pre-eclampsia • Multiple pregnancy	• Hypertensive disease in previous pregnancy • Chronic kidney disease • Autoimmune disease eg systemic lupus erythematosis or antiphospholipid syndrome • Type 1 or 2 diabetes • Chronic hypertension

If the woman has **two moderate risk factors**, or at least **one high risk factor**, she will be advised to take aspirin 150mg/once a day from 12 weeks until 36 weeks of pregnancy, unless she has contraindications. The booking midwife will provide the woman with a 28-day supply of 150mg aspirin/once daily and complete and post a letter to the woman's named GP to inform them and request that they continue to supply aspirin for the remainder of the pregnancy.
Please click on the link to access the Aspirin SOP for the supply of aspirin process and the Patient Group Direction (PGD) for Aspirin. Please click on the link to access a copy of the GP letter.

Women with a history of chronic hypertension or chronic kidney disease should be referred to clinic as per the **Clinical Risk Assessment** guideline using the BadgerNet referral system.

5.1.2 Symptoms of Pre-eclampsia

Advise pregnant women to see a healthcare professional immediately if they experience symptoms of pre-eclampsia. Symptoms include:

- severe headache
- problems with vision, such as blurring or flashing before the eyes

- severe pain just below the ribs
- vomiting
- sudden swelling of the face, hands or feet

5.2 Assessment of proteinuria in hypertensive disorders of pregnancy

Obtain a **midstream sample of urine** in a clean sterile container to test for proteinuria. Do not use the first morning void.

Use an automated reagent-strip reading device, where available, in the hospital or community setting. This method is more reliable than visual assessment and helps prevent 'false positive' results from being sent to the laboratory. If there is no access to an automated reagent-strip reading device, use Multistix urine dipsticks.

If dipstick screening is positive (≥1+ protein) send a urine sample for protein: creatinine ratio (PCR) to the laboratory to quantify the amount of proteinuria being excreted. Maternal weight is required on the laboratory request form for the PCR to be accurately calculated.

- Use 30 mg/mmol as a threshold for significant proteinuria.
- If the result is 30 mg/mmol or above and there is still uncertainty about the diagnosis of pre-eclampsia, consider retesting on a new sample, alongside clinical review.

A urine sample should also be sent for culture at the initial diagnosis of proteinuria. If this confirms infection, then consider retesting/sending urine for PCR once the infection has been treated.

5.3 Assessment of blood pressure

All women should have their blood pressure recorded at booking using a digital monitor that has been validated for use in pregnancy.

Women with chronic or new in pregnancy hypertension/pre-eclampsia or fetal growth restriction diagnosis should continue with digital recorded blood pressure measurements throughout pregnancy.

To reduce errors in blood pressure measurement:

- Use only those automated devices validated for pregnancy (See website: https://stridebp.org/bp-monitors for a list of validated devices). Note: It is recommended from Saving Babies Lives (re: Element 2) that a validated digital monitor used to measure blood pressure.
- Do not 'check' raised BP with manual reading, to limit risk of user bias.
- Measure blood pressure in the sitting or semi-recumbent position so that the arm is at the level of the heart.
- Ensure the correct size of cuff is used.

5.3.1 Diagnosing hypertension

Process- When considering a hypertension diagnosis:

- Measure blood pressure in both arms
- If the difference in reading between both arms is ≥15mmHg, repeat the measurements.
- If, after repeating, the difference between arms remains ≥15mmHg, all subsequent BP readings should be taken in the arm that gives the highest reading

5.3.2 Clinic assessment

- If the reading is ≥ 140/90 during routine assessment, take a second measurement
- If the second reading is significantly different, take a third measurement

Record the lower of the last two measurements as the final BP reading.

5.3.3 Action following diagnosis of hypertension at booking

- All women with chronic hypertension/hypertension at booking will be referred for ANC review in the hypertension clinic by the booking midwife. In women with poorly controlled hypertension, weekly appointments are advised by NICE Guideline NG133 , therefore, these women should be seen in ANC within 1 week.
- The exception to this rule will be any woman who is unwell, symptomatic of her hypertension, or has hypertension in the severe range (160mmHg systolic BP and/or 110mmHg diastolic

BP). These women should be referred straight to Triage. **Do not advise** these women to be seen via gynaecology - they must see an obstetric doctor for their care (though they can later be admitted to the gynaecology ward after review so long as adequate obstetric planning is in place).

5.4 Antihypertensive treatment

5.4.1 Offer antihypertensive treatment to pregnant women who have hypertension and who are not already on treatment if they have:

- sustained systolic blood pressure of 140 mmHg or higher or
- sustained diastolic blood pressure of 90 mmHg or higher

5.4.2 For women on antihypertensive medication, aim for a **target blood pressure of 135/85 mmHg**.

5.4.3 Consider the following medications to treat hypertension in pregnant women:

- Labetalol
- Nifedipine for women in whom labetalol is not suitable
- Methyldopa if both labetalol and nifedipine are unsuitable

Base the choice on any pre-existing treatment, side-effect profiles, risks (including fetal effects) and the woman's preference. Consider using the decision aid from APEC (available at https://action-on-pre-eclampsia.org.uk/public-area/high-blood-pressure-in-pregnancy/) to assist women in decision making on treatment. See **appendix 2** for contraindications, side effects and suggested treatment regimens and doses.

5.4.4 Methyldopa should be stopped within 2 days of birth and changed to an alternative antihypertensive treatment (see section 5.12 for choice of antihypertensive during the postnatal period).

5.5 Patient Information

Women can be signposted to the RCOG Patient Information Leaflet during the antenatal period if they develop pre-eclampsia. The link can be found here:
https://www.rcog.org.uk/en/patients/patient-leaflets/pre-eclampsia

5.6 Women who need additional fetal monitoring

5.6.1 Carry out an ultrasound uterine artery doppler at anomaly scan and fetal growth assessment, liquor volume and umbilical artery doppler starting at 28 - 30 weeks of gestation in women with previous:

- severe pre-eclampsia
- pre-eclampsia that resulted in birth <34 weeks
- pre-eclampsia with a baby whose birth weight <10th customised centile
- intrauterine death (associated with pre-eclampsia)
- placental abruption (associated with pre-eclampsia)

5.6.2 If the onset of the previous pre-eclampsia was earlier than 28 weeks of gestation, commence fetal monitoring at least 2 weeks earlier. This should be arranged even if the current pregnancy is uncomplicated and repeated 4 weeks later.

5.7 Management of chronic hypertension in pregnancy

5.7.1 Pre-pregnancy/early pregnancy advice

Women taking the following medications should be given advice as below:

5.7.1.1 Angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs)

- There is an increased risk of congenital abnormalities if these drugs are taken during pregnancy.
- Discuss alternative antihypertensive treatment with the healthcare professional responsible for managing their hypertension, if they are planning pregnancy.
- Discuss alternative treatment with the healthcare professional responsible for managing their condition if ACE inhibitors or ARBs are being taken for other conditions such as renal disease.
- Stop antihypertensive treatment with ACE inhibitors or ARBs if they become pregnant (preferably within 2 working days of notification of pregnancy) and commence alternative antihypertensive medication.

5.7.1.2 Thiazide or thiazide-like diuretics

- There may be an increased risk of congenital abnormalities and neonatal complications if these drugs are taken during pregnancy.
- To discuss alternative antihypertensive treatment with the healthcare professional responsible for managing their hypertension, if they are planning pregnancy.

5.7.1.3 Antihypertensive treatments other than ACE inhibitors, ARBs, thiazide or thiazide-like diuretics
The limited evidence available has not shown an increased risk of congenital malformation with such treatments.

5.7.2 Treatment of chronic hypertension

5.7.2.1 Offer advice on:

- weight management
- exercise
- healthy eating

- reducing salt intake

5.7.2.2 Continue with existing antihypertensive treatment if safe in pregnancy, or switch to an alternative treatment, unless:

- sustained systolic blood pressure is less than 110 mmHg or
- sustained diastolic blood pressure is less than 70 mmHg or
- the woman has symptomatic hypotension

5.7.2.3 Offer placental growth factor (PlGF) based testing to help rule out pre-eclampsia between 20+0 and 34+6 weeks gestation, on one occasion, if women are suspected as developing superimposed pre-eclampsia. See **appendix 4**.

5.7.3 **Antenatal appointments**

Women with chronic hypertension will be managed in the renal hypertension antenatal clinic. Additional appointments, in DAU or with the community midwife, will be based on the individual needs of the woman and her baby. These may include:

- weekly appointments if hypertension is poorly controlled
- 2 – 4 weekly appointments, on consultant advice, if hypertension is well-controlled and supported by home blood pressure monitoring.

At each appointment measure blood pressure using , urinalysis for proteinuria, undertake blood tests and fetal auscultation. Investigate, and manage blood pressure as per gestational hypertension: see **table 1** and **appendix 1** and refer to Day Assessment Unit Interim SOP.

5.7.4 **Fetal assessment and monitoring**

Carry out ultrasound assessment for fetal growth, liquor volume and umbilical artery doppler at 2 – 4 weekly intervals from 28 weeks of gestation, depending on clinical circumstances. CTGs should not be done routinely and only carried out only if clinically indicated.

5.7.5 **Timing of birth**

5.7.5.1 Do not offer planned early birth before 37+0 weeks of gestation to women with chronic hypertension whose blood pressure is lower than 160/110 mmHg, with or without antihypertensive treatment, unless there are other clinical indications.

5.7.5.2 For women with chronic hypertension whose blood pressure is lower than 160/110 mmHg after 37+0 weeks of gestation, with or without antihypertensive treatment; the timing and the maternal and fetal indications for birth should be agreed between the woman and a consultant obstetrician.

5.7.5.3 If planned early birth is necessary, the woman should be offered a course of antenatal corticosteroids and magnesium sulphate if indicated, in line with the guidance on preterm birth (see guideline: Diagnosis and Management of Preterm Labour).

5.7.6 **Postnatal monitoring and treatment**

5.7.6.1 Frequency of blood pressure monitoring:

- daily for the first 2 days after birth
- at least once between day 3 and day 5 after birth
- as clinically indicated if antihypertensive treatment is changed after birth

5.7.6.2 Aim to keep blood pressure lower than 140/90 mmHg.

5.7.6.3 Continue antihypertensive treatment, if required (see section 5.12 for choice of antihypertensive during the postnatal period).

5.7.6.4 Methyldopa should be stopped within 2 days of birth and changed to an alternative antihypertensive treatment (see section 5.12 for choice of antihypertensive during the postnatal period).

5.7.6.4 Follow up

Recommend that women have a review of antihypertensive treatment 2 weeks after birth and a medical review 6–8 weeks after birth, with their GP. This should be communicated to the GP with a

discharge plan documented on BadgerNet and written by the obstetric team prior to discharge.

5.8 Management of gestational hypertension

5.8.1 Assessment of gestational hypertension

Women presenting with gestational hypertension in the community should be referred to Antenatal Triage for a full assessment. This should take account of the woman's background and any risk factors that require additional assessment and follow up.

5.8.2 Take account of the following risk factors associated with an increased risk of pre-eclampsia that require additional assessment and follow up:

- Nulliparity
- Age ≥40 years
- Pregnancy interval > 10 years
- Family history of pre-eclampsia
- Multiple pregnancy
- BMI ≥35
- Gestational age at presentation
- Previous history or pre-eclampsia or gestational hypertension
- Pre-existing vascular disease
- Pre-existing kidney disease

5.8.3 Offer women with gestational hypertension investigations, treatment and follow up as in **table 1** and **appendix 1** and refer to Day Assessment Unit Interim SOP. Following diagnosis, women will be offered an appointment in an emergency antenatal clinic to plan subsequent management.

Table 1

Gestational Hypertension		
Degree of hypertension	**Hypertension:** BP ≥140/90–159/109 mmHg	**Severe hypertension:** BP ≥160/110 mmHg
Admission to hospital	Do not routinely admit to hospital	Admit If BP falls <160/110 mmHg, then manage as for hypertension
Antihypertensive pharmacological treatment	Offer pharmacological treatment if BP remains >140/90 mmHg	Offer pharmacological treatment to all women
Target blood pressure on antihypertensive treatment	Aim for BP ≤135/85 mmHg but >110/70 mmHg	Aim for BP ≤135/85 mmHg but >110/70 mmHg
Blood pressure measurement	Once or twice a week (depending on BP) until BP is ≤135/85 mmHg	Every 15–30 minutes until BP is <160/110 mmHg
Dipstick proteinuria testing	Once or twice a week (with BP measurement)	Daily while admitted

Blood tests	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
PlGF based testing	Carry out PlGF based testing on one occasion, if there is suspicion of pre-eclampsia between 20+0 and 34+6 weeks gestation	Carry out PlGF based testing on one occasion, if there is suspicion of pre-eclampsia between 20+0 and 34+6 weeks gestation
Fetal assessment	Offer fetal heart auscultation at every antenatal appointment Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 to 4 weeks Carry out a CTG only if clinically indicated	Offer fetal heart auscultation at every antenatal appointment Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 weeks, if severe hypertension persists Carry out a CTG at diagnosis and then only if clinically indicated

5.8.4 **Timing of birth**

5.8.4.1 Do not offer planned early birth before 37+0 weeks of gestation to women with gestational hypertension whose blood pressure is lower than 160/110 mmHg, unless there are other medical indications.

5.8.4.2 For women with gestational hypertension whose blood pressure is lower than 160/110 mmHg after 37+0 weeks of gestation; the timing and the maternal and fetal indications for birth should be agreed between the woman and a consultant obstetrician.

5.8.4.3 If planned early birth is necessary, the woman should be offered a course of antenatal corticosteroids and magnesium sulfate if indicated, in line with guidance on preterm birth (see guideline: Diagnosis and Management of Preterm Labour).

5.8.5 **Postnatal monitoring and treatment**

See **section 5.7.6** and in addition:

5.8.5.1 Antihypertensive treatment:

- continue treatment if required (see section 5.12 for choice of antihypertensive during the postnatal period)
- advise women that the duration of their postnatal antihypertensive treatment will usually be similar to the duration of their antenatal treatment (but may be longer)
- reduce antihypertensive treatment if their blood pressure falls below 130/80 mmHg

5.8.5.2 For women who did not require antenatal treatment of gestational hypertension, start treatment if blood pressure is ≥150/100 mmHg.

5.8.5.3 Discharge communication:

Women will be transferred to the community with a discharge plan on BadgerNet documented by the obstetric team. The plan will inform the GP of actions required and will include the following:

- antihypertensive treatment
- who will provide follow up care, including medical review if required
- frequency of blood pressure monitoring
- thresholds for reducing or stopping treatment
- indications for referral to primary care for blood pressure review
- a recommendation for review of antihypertensive treatment 2 weeks after transfer and a medical review with their GP 6-8 weeks after birth.

5.9 Management of pre-eclampsia

5.9.1 Assessment of pre-eclampsia

Women presenting with symptoms or signs of pre-eclampsia in the community should be referred to Antenatal Triage for further urgent assessment. If severe pre-eclampsia is suspected, women will be admitted directly to Delivery Suite for assessment and management.

5.9.2 A full clinical assessment should be performed at each antenatal contact for women with pre-eclampsia and offer 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
- any maternal biochemical or haematological investigations that cause concern, for example, a new and persistent:
  - rise in creatinine (≥90 µmol/L) or
  - rise in alanine transaminase (>70 IU/L) or
  - fall in platelet count (<150 x 10^9/L)
- signs of impending eclampsia
- signs of impending pulmonary oedema
- other signs of severe pre-eclampsia
- suspected fetal compromise
- any other clinical signs that cause concern

5.9.3 Consider using either the fullPIERS (https://pre-empt.bcchr.ca/evidence/fullpiers) or PREP-S (https://www.evidencio.com/models/show/1038) validated risk prediction models to help guide decisions about the most appropriate place of care (such as the need for in utero transfer) and thresholds for intervention. The result of any risk scoring calculation should not replace senior clinical judgement.

5.9.4 Offer women with pre-eclampsia investigations and treatment as in **table 2** and **appendix 1** and refer to Day Assessment Unit Interim SOP. Women suitable for discharge from hospital will be offered an appointment in an emergency antenatal clinic to plan subsequent management.

Table 2

	Pre-Eclampsia	
Degree of hypertension	**Hypertension:** BP ≥140/90–159/109 mmHg	**Severe hypertension:** BP ≥160/110 mmHg
Admission to hospital	Admit if any clinical concerns for the wellbeing of the woman or baby	Admit If BP falls <160/110 mmHg, then manage as for hypertension
Antihypertensive pharmacological treatment	Offer pharmacological treatment if BP remains >140/90 mmHg	Offer pharmacological treatment to all women
Target blood pressure on antihypertensive treatment	Aim for BP ≤135/85 mmHg. but >110/70 mmHg	Aim for BP ≤135/85 mmHg but >110/70 mmHg
Blood pressure measurement	At least every 48 hours (on DAU or with CMW or with home BP monitor) 4 hourly if the woman is admitted to hospital	Every 15–30 minutes until BP <160/110 mmHg 4 hourly while an inpatient

Dipstick proteinuria testing	Only repeat if clinically indicated, for example, if new symptoms and signs develop or if there is uncertainty over diagnosis	Only repeat if clinically indicated, for example, if new symptoms and signs develop or if there is uncertainty over diagnosis
Blood tests	Measure full blood count, liver function and renal function twice a week	Measure full blood count, liver function and renal function 3 times a week
Fetal assessment	Offer fetal heart auscultation at every antenatal appointment Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 weeks Carry out a CTG at diagnosis and then only if clinically indicated by: • change in fetal movement pattern • vaginal bleeding • abdominal pain • deterioration in maternal condition	Offer fetal heart auscultation at every antenatal appointment Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 weeks Carry out a CTG at diagnosis and then only if clinically indicated by: • change in fetal movement pattern • vaginal bleeding • abdominal pain • deterioration in maternal condition

5.9.5 **Timing of birth**

5.9.5.1 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 3 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

Other features not listed above may also be considered in the decision to plan early birth.

5.9.5.2 Involve a consultant obstetrician in any decisions on timing of birth for women with pre-eclampsia.

5.9.5.3 Discuss with the anaesthetic team if birth is planned in a woman with pre-eclampsia.

5.9.5.4 Discuss with the neonatal team if birth is planned in a woman with pre-eclampsia, and neonatal complications are anticipated.

5.9.5.5 Offer intravenous magnesium sulfate and a course of antenatal corticosteroids if indicated in accordance with guidance on preterm birth, if early birth is planned for women with preterm pre-eclampsia (see guideline: Diagnosis and Management of Preterm Labour).

5.9.5.6 Decide on timing of birth in women with confirmed pre-eclampsia as recommended in **table 3**, dependant on individual circumstances.

Table 3: Timing of birth in women with pre-eclampsia

Weeks of pregnancy	Timing of birth
Before 34 weeks	Continue surveillance unless there are indications (see recommendation 5.8.4.1) for planned early birth. Offer intravenous magnesium sulfate and a course of antenatal corticosteroids in line with guidance on preterm labour and birth.
34 to 36 +6 weeks	Continue surveillance unless there are indications (see recommendation 5.8.4.1) for planned early birth. When considering the option of planned early birth, take into account maternal and fetal condition, risk factors (such as maternal comorbidities, multi-fetal pregnancy) and availability of neonatal unit beds. Consider a course of antenatal corticosteroids in line with guidance on preterm labour and birth.
37 weeks onwards	Initiate birth within 24–48 hours.

5.9.6 **Postnatal investigation, monitoring and treatment**

5.9.6.1 Frequency of blood pressure monitoring

Ask women about severe headache and epigastric pain each time blood pressure is measured.

Women who did not take antihypertensive treatment prior to birth, measure blood pressure:

- at least 4 times a day while the woman is an inpatient
- at least once between day 3 and day 5 after birth
- on alternate days until normal, if blood pressure was abnormal on days 3–5

Women who took antihypertensive treatment prior to birth, measure blood pressure:

- at least 4 times a day while the woman is an inpatient
- every 1–2 days for up to 2 weeks after transfer to community care until the woman is off treatment and has no hypertension

5.9.6.2 Antihypertensive treatment

For women who have taken antihypertensive treatment:

- continue antihypertensive treatment (see section 5.12 for choice of antihypertensive during the postnatal period)
- consider reducing antihypertensive treatment if blood pressure falls below 140/90 mmHg
- reduce antihypertensive treatment if blood pressure falls below 130/80 mmHg

5.9.6.3 For women who did not require antenatal treatment of hypertension, start treatment if blood pressure is ≥150/100 mmHg.

5.9.6.4 Haematological and biochemical monitoring

Check platelet count, renal and liver function 48–72 hours after birth.

- if results are normal do not repeat
- if results are outside normal, repeat as clinically indicated until results return to normal

5.9.6.5 Offer transfer to community care if the following criteria have been met:

- there are no symptoms of pre-eclampsia
- blood pressure, with or without treatment, is ≤150/100 mmHg
- blood test results are stable or improving

5.9.6.6 Discharge communication:

Women will be transferred to the community with a discharge plan on BadgerNet documented by the obstetric team. The plan will inform the GP of actions required and will include the following:

- antihypertensive treatment
- who will provide follow up care, including medical review if needed
- frequency of blood pressure monitoring
- thresholds for reducing or stopping treatment

- indications for referral to primary care for blood pressure review
- self-monitoring for symptoms
- a recommendation for review of antihypertensive treatment 2 weeks after transfer and a medical review with their GP 6-8 weeks after birth.

Recommend women who still have proteinuria (1+ or more) at 6–8 weeks after birth have a further review with their GP at 3 months to assess kidney function.

Recommend referring women with an abnormal kidney function 3 months after birth, for a specialist kidney assessment in line with the NICE guideline on chronic kidney disease in adults.

5.10 Intrapartum care

Women will be managed according to the guideline: Care in Labour on Consultant Unit.

5.10.1 Blood pressure measurement

- hourly in women with hypertension
- every 15 – 30 minutes until BP is <160/110 mmHg in women with severe hypertension

5.10.2 New onset hypertension

Women presenting with new onset and persistent hypertension ≥ 140/90 mmHg during labour will be offered antihypertensive treatment. The increased risk of neonatal hypoglycaemia with labetalol and the need for neonatal blood glucose monitoring will be discussed. Oral nifedipine will be offered as an alternative. Unlike labetalol, nifedipine does not increase the risk of neonatal hypoglycaemia and avoids the need for transitional care of the neonate.

Women commencing antihypertensive treatment during labour will remain in hospital for blood pressure monitoring for at least 24 hours following birth.

5.10.3 Second stage of labour

Do not routinely limit the duration of the second stage in women with controlled hypertension. Consider assisted vaginal birth for women with severe hypertension who have not responded to initial treatment.

5.11 Management of severe hypertension, severe pre-eclampsia and eclampsia

These women will be managed on Delivery Suite, with the involvement of the senior resident anaesthetist and will be reviewed by the tier 2 or consultant obstetrician at least every 4 hours. **See appendix 7 for management flow chart.**

5.11.1 Anticonvulsants

If a woman who has severe hypertension or severe pre-eclampsia, has or previously had an eclamptic fit, give intravenous magnesium sulfate (**see appendix 9 for regimen**).

Consider giving intravenous magnesium sulfate to women with severe pre-eclampsia if birth is planned within 24 hours.

Consider the need for magnesium sulfate 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

5.11.2 Antihypertensives

Treat women with severe hypertension during pregnancy or after birth immediately with one of the following (**see appendices 2** and **5**):

- labetalol (oral or intravenous)
- oral nifedipine
- intravenous hydralazine

Monitor their response to treatment:

- to ensure that their blood pressure falls
- to identify adverse effects for both the woman and the baby
- to modify treatment according to response

Consider using up to 500 ml crystalloid fluid before or at the same time as the first dose of intravenous hydralazine in the antenatal period.

5.11.3 Fluid balance and volume expansion

In women with severe pre-eclampsia, strict fluid balance reduces the risk of pulmonary oedema. In the absence of other clinical concerns, such as haemorrhage, fluid intake is restricted to 80ml/hour, including all medications. If oral fluid intake is tolerated, there is no need to administer intravenous fluids.

Do not use volume expansion in women with severe pre-eclampsia except when using hydralazine as antihypertensive treatment. Do not preload women with intravenous fluids before epidural analgesia.

Hourly urine output will be recorded. Urine output of 100ml/4 hours is adequate.

5.11.4 Mode of delivery

For women with severe hypertension, severe pre-eclampsia or eclampsia, decide on caesarean section or induction of labour according to the clinical circumstances and the woman's preference.

5.11.5 Referral to critical care

Initial assessment and commencement of emergency management should commence on Delivery Suite. For women requiring more than level 1 care, there should be MDT review at consultant level to formulate an individualised management plan and confirm the appropriate setting for ongoing care. Refer women to the appropriate critical care setting as in **table 4** below:

Table 4: Clinical criteria for choice of critical care level

Level 3 care	Severe pre-eclampsia requiring ventilation
Level 2 care Managed with the critical care team	Step down from level 3 or severe pre-eclampsia with any of the following complications: • Hyperkalaemia • Severe oliguria • Coagulation support • Evidence of cardiac failure • Abnormal neurology
Level 2 care Usually managed with the anaesthetic team	IV antihypertensive treatment Initial stabilisation of severe hypertension Eclampsia HELLP syndrome Haemorrhage
Level 1 care Usually managed by the obstetric team alone	Pre-eclampsia with hypertension Conservative management of severe preterm hypertension Step-down treatment after birth

5.12 Antihypertensive treatment during the postnatal period including during breastfeeding.

5.12.1 Advise women with hypertension who wish to breastfeed that their treatment can be adapted to accommodate breastfeeding and that the need to take antihypertensive medication does not prevent them from breastfeeding. Explain the following and make decisions on treatment together with the woman, based on her preferences.

- Antihypertensive medicines can pass into breast milk.
- Most antihypertensive medicines lead to very low levels in breast milk, so the amounts ingested

by babies are very small and unlikely to have any clinical effect.
- Most medicines are not tested in pregnant or breastfeeding women so disclaimers in the manufacturer's information are not due to specific safety concerns or evidence of harm.

5.12.2 As antihypertensive agents have the potential to transfer into breast milk:
- consider monitoring the blood pressure of babies, especially those born preterm, who have symptoms of low blood pressure for the first few weeks
- when discharged home, advise women to monitor their babies for drowsiness, lethargy, pallor, cold peripheries, or poor feeding

Babies with clinical signs of hypotension will be admitted to the Neonatal Unit for monitoring.

5.12.3 Aim to use medicines that are taken once daily or with infrequent dosage interval.

5.12.4 Consider enalapril to treat hypertension with the following monitoring:
- confirm normal renal function and serum potassium prior to commencement
- ask GP to monitor renal function and serum potassium on discharge

5.12.5 For women of black African or Caribbean family origin with hypertension during the postnatal period, consider antihypertensive treatment with:
- nifedipine or
- amlodipine if the woman has previously used this to successfully control her blood pressure

5.12.6 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

5.12.7 Avoid diuretics or angiotensin receptor blockers to treat hypertension in women who are breastfeeding or expressing milk.

5.12.8 Women who are not breastfeeding and not planning to breastfeed should be treated in line with the NICE guideline on hypertension in adults (NICE NG136).

5.13 Risk of recurrence of hypertensive disorders of pregnancy

5.13.1 Advise women with hypertensive disorders of pregnancy that the overall risk of recurrence in future pregnancies is approximately 1 in. See **table 5** below, all figures are approximate. There is no evidence for women who gave birth <28 weeks gestation but risk of recurrence is likely to be at least as high as for women who gave birth at 28 - 34 weeks.

Table 5: Risk of recurrence of hypertensive disorders of pregnancy

Prevalence of hypertensive disorder in **future pregnancy**	Any hypertension in this pregnancy	Pre-eclampsia in this pregnancy	Gestational hypertension in this pregnancy
Any hypertension	21%	20%	22%
Pre-eclampsia	14%	Overall: 16% Birth at 28 – 34 weeks: 33% Birth at 34 – 37 weeks: 23%	7%
Gestational hypertension	9%	6 – 12%	11 – 15%
Chronic hypertension	NA	2%	3%

5.13.2 Advise women who have had pre-eclampsia to achieve and keep a BMI within the healthy range before their next pregnancy.

5.14 Long term risk of cardiovascular disease

Advise women that hypertension in pregnancy is associated with an increased risk of hypertension and cardiovascular disease in later life and that they should discuss with their GP how to reduce this risk with lifestyle interventions such as:
- avoiding smoking
- maintaining a healthy lifestyle

- maintaining a healthy weight

5.15 Management of proteinuria without hypertension. See also section 5.2

When proteinuria is identified without hypertension, a mid-stream urine sample should be sent for culture. Urinalysis should be repeated with a blood pressure check after one week.

If proteinuria persists, a urine PCR and blood tests for renal function (U&E) will be requested. The woman will be seen for weekly blood pressure checks in DAU or with the community midwife. If the woman develops hypertension, she should be referred directly to Triage for assessment and further management which may include:

- further investigations for underlying renal disease
- PlGF based testing
- more frequent monitoring for potential pre-eclampsia
- ultrasound for fetal growth, liquor volume and umbilical artery doppler

Depending on the quantification of proteinuria and the gestation at which it is first identified, referral to the renal hypertension antenatal clinic may be considered.

Recommend that these women have a medical review with their GP 6–8 weeks after birth including urine dipstick for persistent proteinuria.

6.0 Training

The management of Severe Pre-eclampsia and Eclampsia is included in the annual multi-disciplinary training (PROMPT).

7.0 Monitoring/audit

Compliance with this guideline / SOP will be audited as part of the Shrewsbury and Telford Hospital NHS Trust's five-year rolling programme of NICE and local guideline audits, unless circumstances require an earlier or more frequent audit. Results will be reported and acted on in accordance with the Trust Clinical Audit Policy (CG25).

8.0 References

NICE (2019) Hypertension in Pregnancy (QS35)
http://publications.nice.org.uk/hypertension-in-pregnancy-qs35/list-of-quality-statements

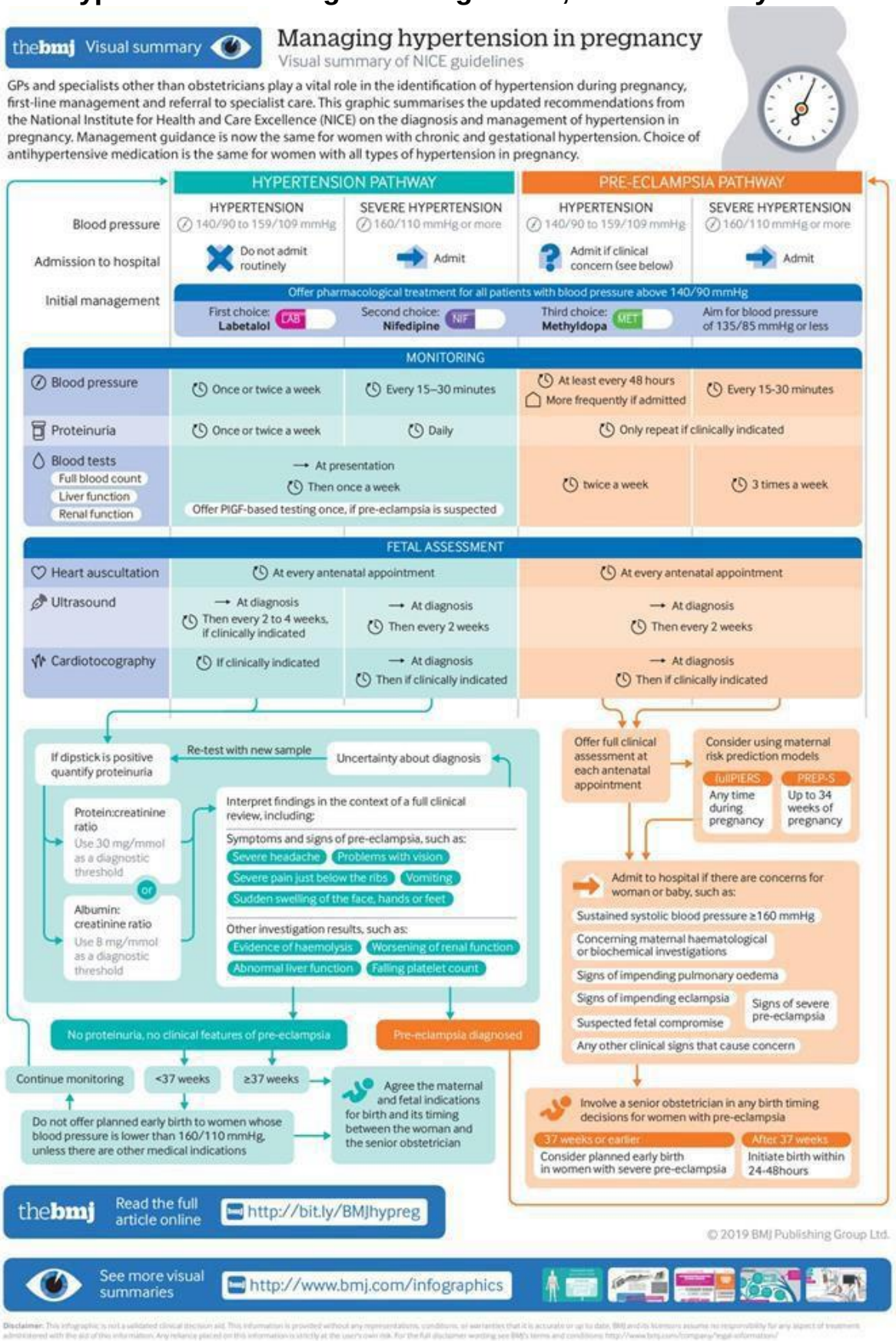
National Institute for health and Care Excellence. NICE. (2023) Hypertension in adults: diagnosis and management. [NG136] 21 Nov 2023

Practical Obstetric Multi-Professional Training, third edition. Eds: Winter C, Crofts J, Draycott T, Muchatata N. Cambridge University Press 2018

BMJ Infographic: https://www.bmj.com/content/366/bmj.l5119/infographic

NICE (2022) PlGF based testing to help diagnose suspected preterm pre-eclampsia [DG 49]

Appendix 1: Hypertension management algorithm, BMJ summary



Hy

Appendix 2: Antihypertensive ORAL Medication

Table 1: Antenatal Oral antihypertensive dosing regimens and suggested stepwise increase of medication for non-urgent / maintenance treatment

	Dosage (mg)							
	Low Dose	**If BP not controlled**		**Medium Dose**	**If BP not controlled**	**High Dose**		**Maximum Dose**
Labetalol	100 TDS-QDS	Proceed to medium dose of same medication	→	200 TDS-QDS	Consider **adding** another low dose rather than high dose of same medication. Max 3 medications	300 TDS-QDS	→	1200/day
Nifedipine MR	10 BD-TDS			20 BD-TDS		30 BD-TDS		120/day
Nifedipine XL or LA	30 OD			20 BD or 60 OD		30 AM and 60 PM		120/day
Methyldopa	250 TDS-QDS			500 TDS-QDS		750 TDS		2500/day

Table 2: Postnatal Oral antihypertensive dose regimens

Treatment of postnatal hypertension			
Drug	Dose	Contraindications	Side effects
Atenolol	25-100mg daily	As below table 3	As below table 3
Nifedipine (SR)	10-40mg bd	As below table 3	As below table 3
Amlodipine	5-10mg od	As nifedipine	As nifedipine – NB amlodipine avoid / use with caution in breastfeeding – see full NICE guideline
Enalapril	5-20mg bd	Avoid in AKI	Hypotension, cough, renal impairment
Labetalol May be less effective in Afro Caribbean women	100mg bd – 200mg QDS	As below table 3	As below table 3
AKI = acute kidney injury; AV = atrioventricular; bd = twice daily; od = once daily; qds = four times daily; SR = sustained release			
ALL are safe in breastfeeding – except see cautions re: amlodipine			

Table 3: Contraindications and side effects

	Contra indications	Side effects
Labetalol (first line treatment of hypertension) *NB May be less effective in women of AfroCaribbean origin* **OR** **Atenolol**	Asthma, cardiac failure, abnormal liver function, history of bronchospasm, heart blocks, bradycardia, phaeochromocytoma	Scalp tingling, difficulty in micturition, nausea and vomiting, headaches, epigastric pain, lichenoid rash. Important: **Postural hypotension** (Avoid upright position for 3 hours after IV infusion), **liver damage** (even after short term use).
Nifedipine	Within 1 month of MI, unstable angina, Aortic stenosis	Important**: Rapid fall in BP** Others: Headaches, GI disturbances, tachycardia, palpitations, flushing.
Methyldopa	Depression (NB advise to convert to another medication within 2 days of delivery) Phaeochromocytoma Acute porphyria	GI disturbance, dry mouth, stomatitis, bradycardia, headache, Bells palsy, hepatitis etc see BNF for further details
Hydralazine	Idiopathic SLE, high output cardiac failure	**Rapid fall in BP** Headaches, GI disturbances, tachycardia, flushing

Appendix 3: Home Blood Pressure Monitoring

Inclusion criteria

Home BP monitoring should only be offered to women who are currently hypertensive and meet the following criteria.

- ✓ chronic hypertension
- ✓ gestational hypertension
- ✓ pre-eclampsia

Exclusion Criteria

- ✓ Normotensive women considered at higher risk of pregnancy hypertension by NICE guidelines should **not** currently be offered a home BP monitor. They may wish to purchase their own.
- ✓ Women who are diagnosed with severe pre-eclampsia.
- ✓ Women who have had any **systolic BP measurement of 160 mmHg** or above and **diastolic BP measurement of 110mmHg** or above.
- ✓ Women with worsening abnormality in PET bloods
- ✓ Women with symptoms of headache, visual disturbances, abdominal pain or feeling unwell.

Home monitors can be obtained from antenatal clinics and from DAU. Measurement of the arm with the supplied tape measure will ensure that the correct size of BP cuff is supplied. A blood pressure monitor loan form will be completed.

Educating women on how to perform and record blood pressure

Women need to be trained in the appropriate technique for taking BP and provided with patient information which includes frequency and monitoring and target BP parameters.

- ✓ Resting for 5 minutes before taking blood pressure.
- ✓ Do not smoke or drink caffeinated beverages for at least 30 minutes before.
- ✓ Take the blood pressure reading before (not after) eating.
- ✓ Sit comfortably with back supported and both feet on the floor (do not cross their legs).
- ✓ Elevate arm to heart level on a table or a desk.
- ✓ Take **BP twice**, at least **one minute apart** and record the second reading.

A patient information leaflet will be provided: Self monitoring blood pressure at home.pdf (sath.nhs.uk)

BP will be checked every 48 hours as a minimum, but frequency will be determined by the obstetrician requesting home BP monitoring.

Refer to Day Assessment Unit Interim SOP (section on hypertension and pre-eclampsia) for follow up and escalation criteria.

Women will be advised to return the BP monitor to DAU PRH by **4 weeks postnatal**.

Once returned, wipe the blood pressure monitor thoroughly with a cleaning Wipe, and check that all components are correct (e.g. cuff, connector, batteries).

BP monitors are asset registered and inspected by Medical Engineering Department annually.

Blood Pressure Thresholds for self-monitoring at home

Level	Blood pressure /mmHg	Action
High	SYS 150 or more OR DIA 100 or more	Your blood pressure is high. Sit quietly for 5 minutes then measure it again and note the reading. If your repeated reading is raised, please contact your maternity unit for review today (within 4 hours) and continue to monitor your blood pressure (BP) daily. If your repeated SYS (systolic) reading is 160 or more, make sure that you make contact with a healthcare professional in this time.
Raised	SYS 140-149 OR DIA 90-99	Your blood pressure is raised. Sit quietly for 5 minutes then measure it again and note the reading. If your repeated reading is raised, please contact your maternity unit within 24 hours and continue to monitor your blood pressure (BP) daily.
High Normal	SYS 135-139 OR DIA 85-89	Your blood pressure is normal but moving towards the raised threshold. Sit quietly for 5 minutes then measure it again and note the reading. If your repeat reading is still high end of normal, please monitor your blood pressure (BP) daily.
Normal	SYS 110-134 AND DIA 70-84	Your blood pressure is normal. Continue blood pressure monitoring and your current care.
Low	SYS 109 or less AND DIA 69 or less	If you are not taking blood pressure medication: Your blood pressure is normal. If you are feeling well this blood pressure does not need any further action. If you are taking blood pressure medication: Your blood pressure is low, contact your maternity unit within 24 hours or within 4 hours if you feel unwell (e.g., dizzy or faint).

Blood Pressure monitoring sheet

The Shrewsbury and Telford Hospital NHS

Please also refer to the thresholds on the front of this sheet

Name_____

Hospital Number_____

Contact Number_____

Microlife monitor asset number_____

To be returned by (date)_____

Date	Time	Systolic (top number)	Diastolic (bottom number)

MY BP MONITORING PLAN

Take BP _____ x per week

1. **Always use the same arm (usually left)**
2. **Wear loose clothing or remove arm from clothing**
3. **Measure BP twice leaving 1 minute between readings then record the 2nd reading in chart**

IMPORTANT INFORMATION

If you have any symptoms that include; **Severe headache** (that does not go away with simple painkillers), problems with **vision, such as blurring or flashing before the eyes, severe pain just below the ribs, nausea or vomiting, heartburn** that does not go away with antacids, **rapidly increasing swelling of the face, hands or feet** (for example if you watch or rings suddenly don't fit), **feeling unwell**

These symptoms are serious and you should seek medical help immediately

The Shrewsbury and Telford Hospital NHS Trust

Microlife Home BP monitoring loan agreement

Microlife monitor serial number_____

SaTH asset number_____

Cuff size supplied_____

Date supplied____/_____/_____

Date to be returned _____/_____/_____

I accept responsibility for the above equipment and I understand that I have been asked to monitor my blood pressure at home during my pregnancy and after as directed by an obstetrician. If the blood pressure monitor becomes damaged or stolen, I understand that I must report this information to the maternity team on (DAU details here). I am not responsible for the cost of repair or replacement

Name	
Hospital Number	
Signature of agreement	
Staff Name	
Staff signature	
Date	

For maternity use

Patient Information

Instructions provided ☐

Demonstration ☐

Monitoring Sheets ☐

Loan agreement copy

1 for patient ☐

1 for loan file ☐

Monitor Returns

Date returned ____/____/____

Cleaned as per SOP ☐

Medical devises check ☐

Appendix 4: PlGF Testing

Indications
Placental growth factor testing is recommended to decide on care (to help rule in or rule out pre-eclampsia) for women with suspected preterm pre-eclampsia in a singleton pregnancy. Pre-eclampsia is defined as new onset hypertension after 20 weeks of pregnancy plus one or more new onset conditions (see section 4.6). If a woman presents with some, but not all these criteria, they are considered to have suspected pre-eclampsia.

It is the responsibility of a tier 2 or consultant obstetrician to authorise the test and follow up the result.

DO NOT use PlGF testing when clinical criteria are sufficient to diagnose pre-eclampsia.

Timing
The test will be offered once only from 20+0 to 34+6 weeks of gestation.

Test
Quidel Triage PlGF test (which is not validated beyond 34+6 weeks of gestation).

Process
Tests will only be accepted from the hospital setting (Triage/DAU/ANC/Antenatal Ward/Delivery Suite).

PlGF will be requested on Review. A blood sample will be taken in an EDTA bottle and sent to the laboratory for analysis, together with the request form.

Tests will be performed during normal working hours on weekdays. Samples taken outside of these hours will be stored in the laboratory for testing on the next working day.

Interpretation of results

Result	Classification	Interpretation	Management
PlGF < 12 pg/ml	Test positive – **highly abnormal**	Suggestive of severe placental dysfunction and at risk of preterm birth	Consider hospital admission and management as for pre-eclampsia
PlGF 12 – 99 pg/ml	Test positive - abnormal	Suggestive of placental dysfunction and at risk of preterm birth	Consider management as for pre-eclampsia
PlGF ≥ 100 pg/ml	Test negative - normal	Not suggestive of placental dysfunction and unlikely to progress to birth within 14 days	Consider alternative diagnoses and manage accordingly

Special considerations
Repeat testing may be considered in specific situations such as a borderline result or a change in clinical circumstances more than 14 days after a previously negative result. Any consideration of repeat testing should be discussed directly with the laboratory by a consultant obstetrician.

Multiple pregnancy

There is insufficient evidence to recommend the use of PlGF based testing in multiple pregnancy. The levels of PlGF may differ hence the specified cut offs may not be appropriate. A test should not be performed without prior discussion with a consultant obstetrician who specialises in management of multiple pregnancy.

Appendix 5: Treatment of Severe Hypertension- Preparation Guides for intravenous antihypertensive medications (FOR USE IN ECLAMPSIA BOXES)

LABETALOL

PREPARATION	BOLUS DOSE	MAINTENANCE DOSE
100mg in 20ml	DRAW UP 100mg (20mls) GIVE 50mg (10ml) SLOWLY over ONE MINUTE CAN BE REPEATED EVERY 5 MINS MAX 4 DOSES (max dose 200mg)	DRAW UP 2 AMPS 200mg (40mls) ADMINISTER VIA SYRINGE PUMP AT 20mg/hr (4ml/hr) INFUSION CAN BE DOUBLED EVERY 30 mins TO MAXIMUM 160mg/hr (32 ml/hr)
CONTRAINDICATIONS	**SIDE EFFECTS**	
Asthma, cardiac failure, abnormal liver function, history of bronchospasm, heart blocks, bradycardia, phaeochromocytoma	Scalp tingling, difficulty in micturition, nausea and vomiting, headaches, epigastric pain, lichenoid rash. Important: Postural hypotension (Avoid upright position for 3 hours after IV infusion), liver damage (even after short term use). **Bradycardia – if pulse below 60 bpm stop infusion**	
NB May be less effective in women of Afro Caribbean origin		

NIFEDIPINE

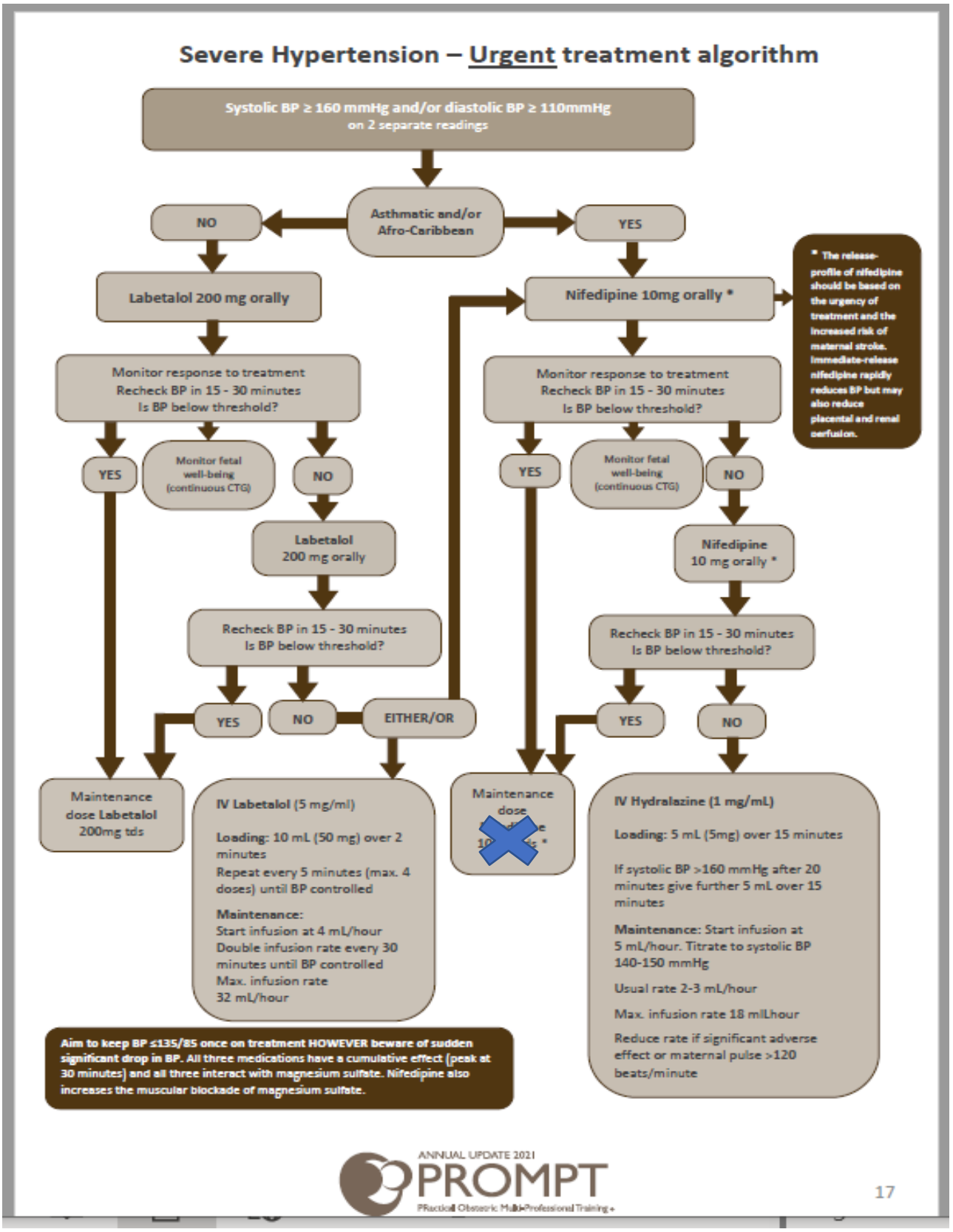
PREPARATION	**DOSE**
ORAL CAPSULE 10 mg **(IMMEDIATE RELEASE)** **Do not crush capsule or give Sublingually**	10mg INITIALLY Measure BP every 10mins REPEAT DOSE OF 10mg AFTER 30 mins If control achieved convert to slow / modified release preparation If not – give alternative antihypertensive
CONTRAINDICATIONS	**SIDE EFFECTS**
Within 1 month of MI, unstable angina. Aortic stenosis	Important**: Rapid fall in BP (with immediate release preps)** Others: Headaches, GI disturbances, tachycardia, palpitations, flushing.

- The release profile of **nifedipine** is not specified in NICE guidance. Decision should be based on requirement for **urgent treatment of severe hypertension due to** increased risk of stroke:
    - Modified-release nifedipine preparations preferable for treatment of moderate hypertension- see table 1 for doses
    - If systolic blood pressure is above 160 mmHg and requiring rapid treatment as there is risk of maternal stroke, **consider** immediate-release nifedipine (10mg)
    - Caution: regarding the risk of reduced placental perfusion with abrupt decreases in blood pressure, especially at higher doses (> 60mg) of immediate-release nifedipine
    - Immediate-release nifedipine should be avoided in women with renal disease, where precipitous drops in blood pressure could be harmful

HYDRALAZINE

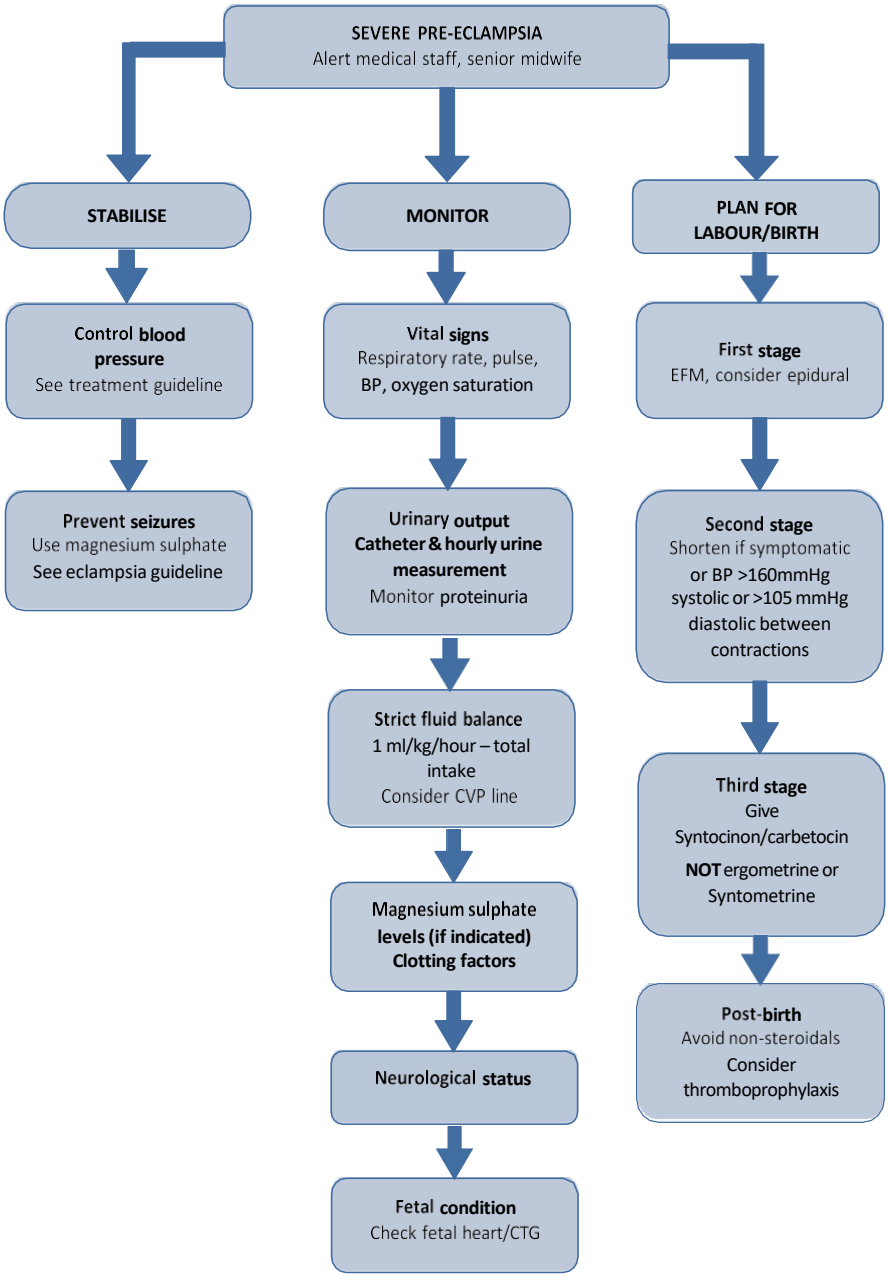
PREPARATION	BOLUS DOSE	MAINTENANCE DOSE
20mg AMPOULE of powder REMEMBER CONSIDER FLUID BOLUS HARTMANN'S SOLUTION 500ml OVER 1 HOUR	MIX 1 AMP 20mg with 20ml NaCl 0.9% (20mg In 20ml) GIVE 5mg (5ml) SLOWLY over 15 MINS CHECK BP at 20 MINS after dose -if systolic >=160 /110 mmHg repeat bolus MAXIMUM 4 x BOLUS	MIX 3 AMPS WITH 60ml NaCl 0.9% (60mg IN 60ml) ADMINISTER VIA SYRINGE PUMP START AT 5ml /hr (5ml/hr) Titrate to systolic BP 140-150mm Hg – usual rate ~2-3mls/hr INFUSION CAN BE DOUBLED EVERY 30 MINS TO MAXIMUM 18 mg/hr (18 ml/hr)
CONTRAINDICATIONS	**SIDE EFFECTS**	
Idiopathic SLE, high output cardiac failure	**Rapid fall in BP** Headaches, GI disturbances, tachycardia, flushing	

Appendix 6: Severe Hypertension Urgent Treatment

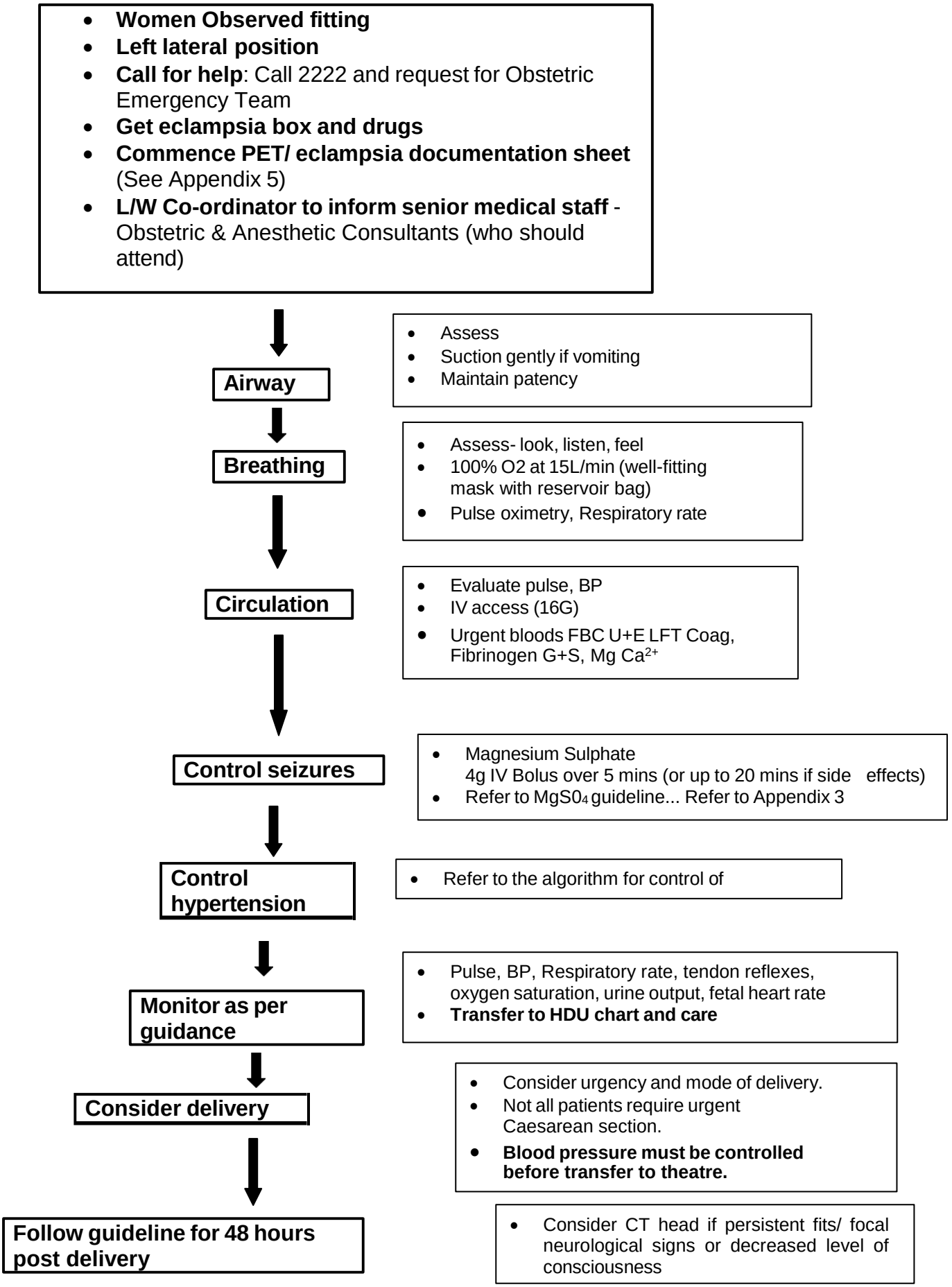


NB FOR NIFEDIPINE DOSES AND REGIMES REFER TO APPENDIX 1 and 2 – ie DO NOT USE 10mg qds maintenance as above

Appendix 7: General Management of Severe Pre-Eclampsia



Appendix 8: Management of Eclampsia Algorithm



Appendix 9: Magnesium Sulfate Regimen

PREPARATION	LOADING DOSE	MAINTENANCE DOSE
Ensure you tilt and mix the syringe at least 10 times as magnesium "layers" and must be mixed well	Mix **4g (8ml) Magnesium** sulfate 50% with **12 mls 0.9% sodium chloride** (to make total 20 mls) SYRINGE DRIVER RATE =80mls/hr to administer over 15 mins Can be given over 5-15 mins slow IV in circumstances when syringe driver not available	Mix 5g (10mls) magnesium sulfate 50% with 40mls 0.9% sodium chloride (to make total 50mls) SYRINGE DRIVER RATE = 10mls/hr =1g/hr Continue until 24hrs after birth or 24 hrs after last seizure
REPEAT SEIZURE	Give further 2g (4 mls) over 15 mins	
CONTRAINDICATIONS	**SIDE EFFECTS**	
Myasthenia Gravis Myocardial damage	Facial flushing Nausea and vomiting Sweating Tachycardia and hypotension; may be more pronounced when given with nifedipine	
CAUTIONS:	Severe renal disease as renally excreted. Concurrent treatment with nifedipine may cause profound hypotension Maximum dose 28g in 24 hrs	

MONITORING (DO NOT ROUTINELY MONITOR Mg SERUM LEVELS)

HOURLY OBS REQUIRED	ONLY CHECK Mg LEVELS AND STOP INFUSION IF:
Urine Output	< 100ml over 4 hours
Respiratory Rate	< 12 / min **Call anaesthetist and consider antidote 10mls 10% Calcium Gluconate slow IV over 10 mins**
Patellar reflexes (Use upper limb if epidural/ spinal)	Absent
Continuous Pulse Oximetry	< 95%

Note: If magnesium is not being excreted, the levels should not fall and no other anticonvulsant is needed. Magnesium sulphate should be re-introduced if urine output improves.

Plasma Mg (mmol/L)	Comment	Action
≤4.0	**Therapeutic range**	**Continue at current infusion rate**
4.1 – 5.0	**May have lost reflexes**	**Halve infusion rate**
5.1 - 12	**Potential for respiratory and CNS depression**	**Stop infusion and consider giving calcium gluconate.**
>12.1	**Cardiac arrest**	

Appendix 10 – Proforma for Severe Pre-eclampsia / Eclampsia

(S RutterV1 Aug22)

PATIENT ID LABEL/
name and unit number

DATE:

	ACTION / TREATMENT				TIME
PREPARE	Initial Observations: BP =	P=	SATS=	RR=	
	Call for senior help via 2222				
	Pre Eclampsia Box and Drugs collected				
	L/W COORDINATOR				
	MIDWIVES -				
	OBS TIER 2		OBS TIER 1		
	ANAESTHETIST TIER 2		ODP		
	CONSULTANT OBS		ANAESTHETIST TIER 3		
ASSESS	Take Full History and examination including neuro exam and reflexes				
	IV access, Bloods (FBC, U+E, LFT, Coag, Fibrinogen, G+S)				
	Consider Fluid restriction to 80 mls/hr / 1 ml/kg/hr				
	HDU chart commenced and regular observations				
	Insert urinary catheter and hourly output- send PCR and dipstick urine				
	Assess Fetal condition (if antenatal)				
STABILISE	**ANTIHYPERTENSIVE MANAGEMENT OPTIONS (aim for <135/85mmHg)**				
	ORAL LABETALOL *200mg GIVEN*				
	BP – 15 mins after oral labetalol BP – 30 mins after oral labetalol ORAL Labetalol 2nd dose 200mg given				
	LABETALOL *BOLUS IV 50mg over 1min- document BPs on HDU chart and drugs*				
	DOSE 1 TIME	BP AT 5MINS POST DOSE			
	DOSE 2 TIME	BP AT 5MINS POST DOSE			
	DOSE 3 TIME	BP AT 5MINS POST DOSE			
	DOSE 4 TIME	BP AT 5MINS POST DOSE			
	LABETOLOL INFUSION Commenced at rate=				
	HYDRALAZINE BOLUS IV 5mg over 15 mins IV **- consider load with Hartmanns 500ml over 1st hour**				
	DOSE 1 TIME	BP AT 20 MINS			

	DOSE 2 TIME BP AT 20 MINS DOSE 3 TIME BP AT 20 MINS DOSE 4 TIME BP AT 20 MINS HYDRALAZINE INFUSION commenced	
	NIFEDIPINE ORAL 10mg CAPSULE (NOT SLOW RELEASE) BP at 10mins post BP at 20mins BP at 30 mins If BP not responding repeat 10mg nifedipine at 30mins post initial dose BP at 10mins post BP at 20mins BP at 30 mins	
	SEIZURE PROPHYLAXIS:	
	$MgSO_4$ Loading dose (4g over 5 mins -15 mins)	
	$MgSO_4$ Maintenance (1g/ hr) commenced	
	Start Hourly monitoring – BP,P, Sats , RR, Reflexes, Urine Output	
FETAL ASSESSMENT		
	Plan for labour/birth (if applicable)	
	Electronic Fetal monitoring (if applicable)	
	Consider Antenatal Corticosteroids and 1st dose given	
	NNU informed (if applicable) and Neonatal Tier 2 review	

ECLAMPSIA –	**TIME OF SEIZURE:**	**SEIZURE STOPPED:**
CALL FOR HELP	EMERGENCY BUZZER	
	2222 ACTIVATED	
ABC	LEFT LATERAL	
	AIRWAY MAINTAINED	
	BREATHING, OXYGEN APPLIED high flow	
	CIRCULATION – IV access and blood sent urgent (FBC,U+E, LFT, Clotting, Fibrinogen , Calcium , Mg , G+S) Capillary glucose done at bedside	
TREAT SEIZURE	$MgSO_4$ Loading dose (4g over 5 - 15 mins if s/e)	
	$MgSO_4$ Maintenance (1g/ hr)	
	TIME OF RECURRENT SEIZURE	
	$MgSO_4$ Reloaded (2g over 5 -15mins (if applicable)	
ASSESS AND MONITOR (inc fetal if antenatal) as overleaf		