HYPERTENSIVE DISORDERS – ANTENATAL, INTRAPARTUM AND POSTNATAL (INCLUDING CHRONIC HYPERTENSION, PRE-ECLAMPSIA, PLGF TESTING, AND HOME BLOOD PRESSURE MONITORING)

Additional guidance for Management of HELLP/AFLP/Eclampsia - link

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

Introduction

Guideline for the management of hypertension in pregnancy including Chronic Hypertension, Pre-Eclampsia, PLGF, Home blood pressure monitoring, Eclampsia and HELLP

This Local Guidance has been formed utilising the NICE Hypertension in pregnancy: diagnosis and management [NG133] Guideline. Referral to this NICE guideline should be made for any additional information required.
The Royal College of Obstetricians and Gynaecologists (RCOG) made recommendations published in March 2020 for the healthcare professionals on self-monitoring of BP in pregnancy as a reliable and acceptable means of monitoring hypertensive patients during pregnancy and postpartum compared with the traditional pathways of outpatient BP monitoring. See page 15 for Home Blood Pressure monitoring guidance.

This guideline is for use by the following staff groups:
All staff responsible for detecting, diagnosing and treating hypertensive disorders in pregnancy.

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Approved by Maternity Governance Meeting on:	25th September 2026
Approved by Medicines Safety Committee on: *Where medicines are included in document.*	August 2020
Review Date: This is the most current document and should be used until a revised version is in place	25th September 2029

Key amendments to this guideline

Date	Amendment	Approved by:
Aug 2020	Updated Guideline	MGM
Oct 2023	Addition of Postnatal Blood Pressure management appendices and review criteria.	MGM
Dec 2024	Review in Line with NICE Guidance [NG133] and clarification surrounding chronic hypertension	MGM
Sept 26	Alignment of PLFG introduction Amalgamation of Home blood pressure guidelines HBPM integrated	MGM

Contents

Introduction	**page 4**
Aspirin	**page 5**
Antenatal	**page 7**
How to measure blood pressure	**page 8**
Chronic Hypertension chart	**page 9**
Gestational Hypertension chart	**page 10**
Management of pre-eclampsia chart	**page 11**
PlGF Testing	**page 12**
Timing of birth	**page 13**
Postpartum management flowchart	**page 14**
Home blood pressure monitoring	**page 16**
Rainbow chart for home BP	**page 18**
Drug Protocols	**page 20**
Blood pressure monitor loan form	**page 22**

Introduction

Hypertension complicates 6-8% of all pregnancies with around 5/1000 maternities in the UK suffering severe pre-eclampsia, and 5/10 000 maternities suffering eclampsia. In eclampsia, the case fatality rate has been reported as 1.8% and a further 35% of women experience a major complication.

- The definition and classification of the hypertensive disorders of pregnancy still lack universal agreement. For this guideline, we will use the classifications used by NICE.
- Not all pregnant women who have proteinuria and hypertension have diseases specific to pregnancy and groups have varying clinical outcomes.
- It should be remembered that autoregulation of the maternal cerebral circulation only breaks down at blood pressures of 170/110 mmHg. The evidence that antihypertensive drugs protect the mother from morbidity is most significant at these higher levels.
- Treatment of hypertension should be commenced when BP is >140/90 mmHg. Patients with chronic hypertension, pre-eclampsia and postpartum hypertension are managed in the same way.

Hypertension in Pregnancy

Women with hypertensive disorders of pregnancy have been subdivided as follows:

- Gestational hypertension or Pregnancy induced hypertension PIH
- Chronic Hypertension – pe-existing hypertension prior to pregnancy or before 20 weeks
- Pre-eclampsia – high blood pressure usually accompanied by proteinuria
- Pre-eclampsia superimposed on chronic hypertension – pre-existing hypertension with new signs or symptoms after 20 weeks

According to NICE, degree of hypertension can be defined as:
Hypertension: Blood pressure of 140-159/90-109 mmHg
Severe hypertension: Blood pressure >160/110 mmHg or greater

Future pregnancies

- Evidence suggests that up to 13% of women with pre-eclampsia will have underlying chronic or essential hypertension that was not suspected antenatally.
- Women should be counselled about the risk of recurrence of pre-eclampsia in subsequent pregnancy and should be aware that:
    - The risk of developing gestational hypertension in a future pregnancy ranges from about 1 in 8 (6-12%)
    - The risk of developing pre-eclampsia in a future pregnancy is up to about 1 in 6 (16%)
    - If birth was at 28-34 weeks this is 1 in 3 women (33%)
    - If birth was 34-37 weeks 1 in 4 women (23%)
    -

Antihypertensive drugs to avoid in pregnancy

- **Atenolol** - Should be avoided as there is some evidence that its use may be linked to fetal growth restriction when given in early pregnancy. Other beta-blockers are seldom used due to lack of data on their safety during pregnancy.

ACE inhibitors and angiotensin II receptor antagonists (ARB) - must not be used during pregnancy as there is increased risk of congenital abnormalities. ACE inhibitors during the second and third trimester cause fetal renal dysfunction, with oligohydramnios, intrauterine death from renal failure. The adverse effects of ARB are likely to be similar to those of ACE inhibitors although there is little data available. Accidental exposure to ACE inhibitors or ARB in the first trimester is not grounds for termination of the pregnancy.

Diuretics - are relatively contraindicated in pregnancy. There may be an increased risk of congenital abnormalities and neonatal complications if they are taken. They should be reserved for the management of pulmonary oedema.

Reducing the risk of PET (Risk Assessment) See Aspirin SOP.

- NICE recommends that Aspirin reduces the risk of pregnancy complications from placental disease, particularly pre-eclampsia. Therefore, a full history at booking is essential
- Dosage is 150mg PO/OD from 12/40 weeks and may be more effective if taken at night
- Contraindications include Aspirin allergy and history of GI bleeding or ulceration
- Aspirin is not contraindicated in active bleeding during pregnancy and should not be stopped in cases of PV bleeding
- A reduced dose of 75mg may be considered in cases of hepatic or renal impairment
- Aspirin can either be bought over the counter or prescribed by an obstetrician or GP

Risk level	Risk Factors	Recommendation
Pre-Eclampsia **High**	• Hypertensive disease in previous pregnancy • Chronic renal disease • Autoimmune disease such as SLE or APS • Type 1 or Type 2 Diabetes mellitus • Chronic hypertension • Evidence of placental dysfunction in a previous pregnancy e.g. SGA <10th centile, evidence of FGR or placental histology suggestive of placental dysfunction (see FGR risk factors)	Low dose Aspirin in 1 or more high risk factors 150milligrams PO/OD nocte From 12/40 - 36/40
Pre-Eclampsia **Moderate**	• First pregnancy • Maternal age (>40yrs at booking) • Inter-pregnancy level >10 years • BMI >35 at booking • Family history of pre-eclampsia in first degree relative • Multiple pregnancy	Low dose Aspirin in 2 or more high risk factors 150milligrams PO/OD nocte From 12/40 - 36/40
FGR **Moderate/High**	**History** • Previous SGA or FGR • Previous stillbirth • Gastric bypass surgery (to discuss with consultant due to increased risk of marginal ulcers with aspirin) • Previous preterm birth / second trimester • Miscarriage (placental mediated if known) **In Current Pregnancy** • Smoker • Drug misuse • BMI <18.5 with other features • PAPP-A <5th centile • Echogenic bowel • Significant bleeding • Single umbilical artery	Low dose Aspirin if any risk factors 150milligrams PO/OD nocte From 12/40 - 36/40

Definitions and brief explanation

Gestational Hypertension –

- New Hypertension after twenty weeks of pregnancy (PIH) *(Leaflet for patients)*

Chronic Hypertension –

- History of hypertension pre-conception / before 20 weeks of pregnancy or hypertension that fails to resolve postnatally. *(Leaflet for patients)*
- If hypertension is identified at booking, the chronic hypertension pathway should be followed and refer to GP

Pre-eclampsia –

- Hypertension after twenty weeks of gestation, returning to normal postpartum AND proteinuria 3g/24hours or a PCR 30 mg/mmol ± oedema and virtually any organ system may be affected. *(Leaflet for patients)*

Pre- eclampsia superimposed on chronic hypertension –

- Development of new signs and/or symptoms of pre-eclampsia after twenty weeks of gestation in a woman with chronic hypertension.

Degrees of hypertension –

- According to NICE guidance, degrees of hypertension can be defined as:
- Hypertension: Blood pressure of 140-159/90-109 mmHg
- Severe hypertension: Blood pressure >160/110 mmHg or higher

Urinalysis / Urine dipstick –

- All women should be offered urinalysis at each antenatal appointment. This should test for proteinuria in order to aid decision making when there are signs and symptoms of pre-eclampsia and/or identified hypertension.
- First morning void should not be used to identify proteinuria.

Proteinuria –

- If proteinuria (1+) is identified on urine dipstick, a Protein: Creatinine Ratio (PCR) sample should be sent for analysis. 24-hour urine collection should not be used to quantify proteinuria in pregnant women.

PCR –

- If the PCR result is 30mg/mmol or more, this is classified as significant proteinuria.
- If the result is 30mg/mmol or more and there is uncertainty around the diagnosis, consider sending a new sample alongside a clinical review. These results should be used in conjunction with a full clinical assessment to form a diagnosis of pre-eclampsia.
- Repeat PCR is not recommended if preeclampsia is diagnosed.

Oral Anti-hypertensive medication –

- Labetalol – 1st line treatment - given orally (BD, TDS or QDS)

Starting dose BD 200milligrams up to a maximum of 2.4g daily divided into 3-4 doses

*Labetalol is contraindicated for patients with Asthma

There is no clear evidence about response of Afro-Caribbean patients to Labetalol in pregnancy so low threshold to start another antihypertensive in this group.

- Nifedipine – 1st line treatment if Labetalol not suitable

10milligrams BD up to 40milligrams - maximum dose 80milligrams daily

- Methyldopa – 1st line treatment if both Labetalol and Nifedipine unsuitable

Starting dose 250milligrams BD up to maximum 3g daily in 3-4 doses

Should be stopped within 2 days of birth and changed

- Enalapril – in the postnatal period only

Starting dose OD - 5 or 10milligrams up to 20milligrams (BD) - maximum dose 40milligrams daily

** See drug protocols for IV medication in severe PET

CAUTION – Drugs can have a cumulative effect and interact with magnesium sulphate.

Antenatal

- For all pregnant people at each contact:
- Perform urinalysis to check for proteinuria.
- Ask about signs and symptoms of pre-eclampsia
- If blood pressure measured in the clinic is 140/90 mmHg or higher:
  - Take a second measurement during the consultation.
  - If the second measurement is substantially different from the first, take a third measurement.
    Record the lower of the last 2 measurements as the clinic blood pressure.
- If this measurement is taken in community, DAU, KTC, or Alex and requires review:
- Refer into Triage for a full assessment with an obstetrician.
- Reassure woman.
- If ++proteinuria or above 160/110mmHg, contact registrar on call for prescription and administer antihypertensive if available - consider transport via ambulance if unwell

PLGF testing is available across all sites, within DAU at Kidderminster and Redditch and in triage at WRH, it should be considered for singleton pregnancies in women between **20+0** and **35+6** weeks gestation who present with:

1) **Chronic hypertension with clinical suspicion of developing pre-eclampsia**
- *This is especially relevant because chronic hypertension increases the risk of developing pre-eclampsia, and early identification can significantly improve maternal and fetal outcomes.*
2) **Gestational hypertension meeting the criteria in table 1**
3) **Proteinuria with clinical suspicion of developing pre-eclampsia**
4) **Fetal growth restriction likely due to placental insufficiency where there is clinical uncertainty about whether pre-eclampsia is developing:**

- Estimated fetal weight (EFW) or abdominal circumference (AC) less than the 3rd centile
  - OR
- *EFW or AC <10th centile with evidence of placental dysfunction (either):*

1) *Abnormal uterine artery Doppler (mean pulsatility index >95th centile) earlier in pregnancy 20-24 weeks*
2) *Abnormal umbilical artery Doppler (absent or reversed end diastolic flow or pulsatility index >95th centile)*

- Note: Not recommended for multiple gestation pregnancies
- Note: PlGF testing is not suitable for use on confirmed PET

***NB repeat testing can be considered based on senior obstetricians' decision*

Test result interpretations and actions can be found in the PlGF SOP or below in the traffic light chart.

A BP reading of 150/100 or higher must be referred to triage at WRH as they are unsuitable for assessment at other DAU sites

How to measure blood pressure

As outlined in Saving Babies Lives Care Bundle Version 3, blood pressure must only be measured using a digital blood pressure monitor. The use of manual sphygmomanometers has now been discontinued, and these should not be used to measure blood pressure in pregnant women.

Ensure that:

- The correct size cuff is used for the circumference of the arm
- The woman is sitting upright and has had an opportunity to relax



Chronic Hypertension

Timeline	Pre-existing chronic hypertension Well controlled ≤135/85mmHg	Pre-existing chronic hypertension Poorly controlled >135/85mmHg	Newly diagnosed before 20 weeks gestation
Current hypertensive medication	Continue with existing treatment if safe in pregnancy, see antihypertensives drugs to avoid, or switch to an alternative unless: Sustained systolic is <110mmHg **or** Sustained diastolic is <70mmHg **or** Symptomatic of hypotension	Weekly BP measurements on DAU with titration of medication until target BP of 135/85mmHg achieved	If not on treatment - offer an antihypertensive for chronic hypertension if they have: Sustained systolic of 140mmHg or higher **or** Sustained diastolic of 90mmHG or higher
BP monitoring	Monitoring should take place every 2-4 weeks during scheduled community midwife appointments	Weekly BP (DAU) as above until target BP achieved then move to well controlled column.	Personalised plan of care needed to establish pattern of BP and achieve desired target
At booking appointment	Check BP, take full medication history Baseline bloods alongside regular booking bloods (U&E's and renal pathology)	Check BP, take full medication history Baseline bloods alongside regular booking bloods (U&E's and renal pathology)	Check BP, take full medication history Baseline bloods alongside regular booking bloods (U&E's and renal pathology)
Tests	Booking bloods plus full renal profile, U&E's, LFT, MSU, dipstick at booking if proteinuria send PCR		
Risk Assessment	**Complete full risk assessment and start on Aspirin as per guideline**		
Referrals	• Consultant led care • Maternal medicine • Refer for Uterine Artery Doppler • Serial growth scans (scan pathway dependent on UtAD)	• Consultant led care • Maternal medicine • Refer for Uterine Artery Doppler • Serial growth scans (scan pathway dependent on UtAD)	• Consultant led care • Maternal medicine • Refer for Uterine Artery Doppler • Serial growth scans (scan pathway dependent on UtAD)
Home blood pressure monitoring	If well controlled offer HBPM weekly or check BP with CMW every 2-4 weeks if not keen on HBPM	Alternative day HBPM checked as per HBPM guidance by DAU if outside target range titration of medication on DAU/ ANC	Alternative day HBPM checked as per HBPM guidance by DAU if outside target range titration of medication on DAU / ANC
Dipstick proteinuria testing	Urine dipstick for routine antenatal care should continue. ≥1+ protein send PCR	Urine dipstick for routine antenatal care should continue. ≥1+ protein send PCR	Urine dipstick for routine antenatal care should continue. ≥1+ protein send PCR
PIGF testing **Between 20+0 - 35+6**	Carry out PLGF if suspicion of Pre-eclampsia between 20+0 and 35+6 weeks gestation. Act on result - see interpretation and action chart Underlying kidney conditions etc must be taken into consideration	Carry out PLGF-based testing on 1 occasion (in accordance with NICE guidance, see recommendation 1.4.4) if there is suspicion of pre- eclampsia between 20 and 35+6 weeks ** Anyone with a blood pressure of up to 150/100 with 1+ protein can be seen at KTC or The Alex. BP above this threshold should be seen at WRH triage	PIGF testing not required if before 20 weeks' gestation.
Fetal assessment	Offer fetal heart auscultation at every antenatal contact and act accordingly Serial growth scans (scan pathway dependent on UtAD)	Offer fetal heart auscultation at every antenatal contact and act accordingly Serial growth scans (scan pathway dependent on UtAD)	Offer fetal heart auscultation at every antenatal contact and act accordingly Serial growth scans (scan pathway dependent on UtAD)
Chronic hypertension may be diagnosed pre-pregnancy or identified in early pregnancy (before 20 weeks gestation). If this has been diagnosed pre-pregnancy, full history should be taken including management and treatment. Current medication should be documented and assessment for suitability in pregnancy should be arranged with the GP if this has not already taken place.			
<16/40 weeks gestation - under primary care for treatment (GP) maintain existing medication if safe for use in pregnancy >16/40 weeks gestation - under secondary care for treatment (obstetrics)			

It is the responsibility of every individual to ensure this is the latest version as published on the Trust Intranet

Gestational Hypertension

Management of pregnancy with gestational hypertension (NICE NG133)

Management	Well controlled after initial presentation/treatment (≤135/85mmHg)	Hypertension (140/90 - 150/109mmHg) *Or BP normal with additional risk factors*	Severe Hypertension (160/110mmHg or more)
Admission to hospital	Not required	Do not routinely admit to hospital	Admit - if BP falls below 160/110mmHg then manage as for hypertension
Antihypertensive pharmacological treatment	Maintain normal BP with antihypertensives	Offer pharmacological treatment if BP remains above 140/90mmHg	Offer pharmacological treatment for all women
Target blood pressure once on antihypertensive treatment	Maintain BP of 135/85mmHg or less with medication adjusted accordingly	Aim for BP of 135/85mmHg or less with medication adjusted accordingly	Aim for BP of 135/85mmHg or less with medication adjusted accordingly
Blood pressure measurements	Home blood pressure monitoring to commence - continue with twice weekly measurements	Twice a week (depending on BP) until BP is 135/85mmHg or less	Every 15-30 minutes until BP less than 160/110mmHg
Dipstick proteinuria testing - ≥1+ protein at any point - **send PCR**	Fortnightly (CMW alternating with 4 weekly scans)	Twice a week (with BP measurements)	Daily whilst admitted
PIGF testing **See indications for PIGF testing**	Carry out PIGF test on initial presentation or suspicion of Pre-eclampsia. Act on result - see interpretation and actions chart. ***Underlying kidney conditions etc. must be taken into consideration.***	Carry out PIGF test on 1 occasion (in accordance with NICE guidance, see recommendation 1.4.4) if there is suspicion of pre-eclampsia **** Anyone with a blood pressure of up to 150/100 with or without 1+ protein can be seen at KTC or the Alex. BP above this threshold should be seen at WRH triage.**	Carry out PIGF test on 1 occasion (in accordance with NICE guidance, see recommendation 1.4.4) if there is suspicion of pre-eclampsia
PCR (normal range 0-30mg/mmol)	Raised PCR >30mg/mmol - consult obstetric team. Treat as pre-eclampsia	Raised PCR >30mg/mmol - consult obstetric team. Treat as pre-eclampsia	Raised PCR >30mg/mmol - consult obstetric team. Treat as pre-eclampsia
Blood tests	Fortnightly (CMW alternating with 4 weekly scans)	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
Fetal assessment	Offer fetal heart auscultation at every antenatal contact Carry out ultrasound assessment of the fetus at diagnosis and, if normal repeat every 2-4 weeks if clinically indicated. (Bloods and urine check at same appointment) Carry out CTG only if clinically indicated.	Offer fetal heart auscultation at every antenatal contact Carry out ultrasound assessment of the fetus at diagnosis and, if normal repeat every 2-4 weeks if clinically indicated. (Bloods and urine check at same appointment) Carry out CTG only if clinically indicated.	Offer fetal heart auscultation at every antenatal contact Carry out ultrasound assessment of the fetus at diagnosis and, if normal repeat every 2-4 weeks if clinically indicated. (Bloods and urine check at same appointment) Carry out CTG only if clinically indicated
Home blood pressure monitoring	Twice weekly home blood pressure monitoring alongside urine dipstick as documented above. Ensure women and birthing people have a good awareness of signs and symptoms to look out for.	Not required - BP and urine dipstick twice a week until BP is 135/85mmHg or less, when suitable to commence home blood pressure monitoring.	Inpatient - not required
Full assessment should take place with any presentation of BP at 140/90mmHg or higher - **if above 150/100mmHg refer to triage at WRH for PIGF test if appropriate, and review, as not suitable for review at other sites.			

Pre-Eclampsia

Management of pregnancy with pre-eclampsia (NICE NG133)

Management	Well controlled after initial presentation/treatment (≤135/85mmHg)	Hypertension (140/90 - 150/109mmHg) *Or BP normal with additional risk factors*	Severe Hypertension (160/110mmHg or more)
Admission to hospital	Admit if any clinical concerns for the wellbeing of the woman or baby or if high risk for adverse events.	Admit if any clinical concerns for the wellbeing of the woman or baby or if high risk for adverse events.	Admission with monitoring and treatment as required.
Antihypertensive pharmacological treatment	Offer pharmacological treatment to maintain blood pressure within required parameters.	Offer pharmacological treatment if BP remains above 140/90mmHg	Offer pharmacological treatment for all women
Target blood pressure once on antihypertensive treatment	Maintain BP of 135/85mmHg or less with medication adjusted accordingly	Aim for BP of 135/85mmHg or less with medication adjusted accordingly	Aim for BP of 135/85mmHg or less with medication adjusted accordingly
Blood pressure measurements	Twice weekly - DAU Enquire about signs or symptoms of pre-eclampsia	Twice weekly - DAU Enquire about signs or symptoms of pre-eclampsia	Every 15-30 minutes until BP less than 160/110mmHg, then at least 4 times daily while an inpatient depending on clinical circumstances and if symptomatic.
Dipstick proteinuria testing - ≥1+ protein at any point - **send PCR**	If high PCR (>30) do not repeat. Repeat dipstick for proteinuria not required. Urine dipstick for routine antenatal care should continue. (DAU)	If high PCR (>30) do not repeat. Repeat dipstick for proteinuria not required. Urine dipstick for routine antenatal care should continue. (DAU)	If high PCR (>30) do not repeat. Repeat dipstick for proteinuria not required. Urine dipstick for routine antenatal care should continue. (DAU)
PIGF testing	Confirmed PET - PIGF testing **not required.**	Confirmed PET - PIGF testing **not required.**	Confirmed PET - PIGF testing **not required.**
Blood tests	Measure full blood count, liver function and renal function at presentation and then twice weekly (DAU)	Measure full blood count, liver function and renal function at presentation and then twice weekly (DAU)	Measure full blood count, liver function and renal function at presentation and follow up bloods according to clinical need.
Fetal assessment	Offer fetal heart auscultation at every antenatal contact **Carry out ultrasound assessment of the fetus at diagnosis** and, if normal repeat every 2 weeks. Carry out CTG only if clinically indicated.	Offer fetal heart auscultation at every antenatal contact **Carry out ultrasound assessment of the fetus at diagnosis** and, if normal repeat every 2 weeks. Carry out CTG only if clinically indicated.	Offer fetal heart auscultation at every antenatal contact **Carry out ultrasound assessment of the fetus at diagnosis** and, if normal repeat every 2 weeks. Carry out CTG at presentation and further CTG monitoring BD or as clinically indicated. Ensure further scans and follow up are arranged as an outpatient once blood pressure is controlled.
Home blood pressure monitoring	Not suitable	Not suitable	Not suitable
Symptoms of severe pre-eclampsia	• Severe headache • Epigastric pain and/or vomiting • Visual disturbance • Significant swelling of face, hands, feet • Bleeding per vagina	*Signs of severe pre-eclampsia*	• Clonus >1 beat • Papilledema on fundoscopy • Fetal condition / CTG • Liver tenderness
Retake blood pressure to confirm reading, perform urinalysis - follow up blood results			
For severe PET - Fluid restriction to 80millilitres/hr, commence MGSO4. Strict input/output chart and follow guideline for severe PET / Eclampsia			
Follow guidance in Fluid Balance and Hyponatraemia in Labour and the immediate Postpartum Period			

PIGF testing

Indications for testing – See PIGF SOP for detailed explanation

PIGF testing should be considered in women between 20+0 and 35+6 weeks gestation who present with:

1. Chronic hypertension with clinical suspicion of developing pre-eclampsia
2. Gestational hypertension meeting the criteria in the management table above
3. Proteinuria with clinical suspicion of developing pre-eclampsia
4. Fetal growth restriction likely due to placental insufficiency with suspicion of pre-eclampsia
   •

- Note: Not recommended for multiple gestation pregnancies
- Note: PIGF testing is not suitable for use on confirmed PET
- Note: Repeat testing may be considered at the discretion of the senior obstetrician
- Note: Underlying Kidney conditions must be taken into consideration

Interpretation and actions based on results of PIGF test

	PLGF ≥100 Normal	**PIGF 12-99 Low**	**PIGF <12 Very Low**
Interpretation	• Test negative - normal • Pre-eclampsia ruled out • Highly unlikely to need delivery due to pre-eclampsia within 14 days	• Test positive - abnormal • Pre-eclampsia not ruled out • Increased risk for preterm delivery	• Test positive - highly abnormal • Assess as pre-eclampsia • Increased risk for preterm delivery
What does it mean?	98% of patients who are in this range will not need delivery for pre-eclampsia within 14 days	A PIGF test result <100pg/ml will correctly identify 95-96% of patients with pre-eclampsia who need delivery within 14 days	Group at highest risk of preterm delivery and fetal growth restriction. 94% of patients presenting before 35 weeks with PIGF <12pg/ml will give birth preterm
Median time to delivery	<35 weeks - 62 days 35-37 weeks - 16 days	<35 weeks - 23 days 35-37 weeks - 9 days	<35 weeks - 9 days 35-37 weeks - 4 days
Plan	Continue with antenatal care as clinically indicated in line with guidance. Do not run the PET bloods drawn.	Follow gestational hypertension table as appropriate. (consider home blood pressure monitoring) with regular monitoring and fetal ultrasound as indicated. **Run the PET bloods drawn** Arrange fetal USS for growth and dopplers unless done within past two weeks. If gestation 35-37 weeks - twice weekly BP and urine dip on DAU	Assess as pre-eclampsia (regardless of proteinuria) with increased surveillance and fetal ultrasound as indicated. Follow pre-eclampsia table. **Run the PET bloods drawn.** Discuss with senior obstetrician. **For BP >160/110mmHg** Treat as pre-eclampsia Admit Treat hypertension Clear plan of care - document in notes.

Timing of birth

Gestational hypertension

- Do not deliver before 37 weeks if the BP is lower than 160/110mmHg, with or without anti-hypertensive medication, unless there are medical indications or concerns about fetal wellbeing.
- After 37 weeks, if the BP is lower than 160/110mmHg with or without ant-hypertensives, the timing of delivery should be agreed between the woman and a senior obstetrician, taking into account maternal and fetal indications. Plan for delivery after 39 weeks should be considered.
- Corticosteroids and magnesium sulphate should be given if indicated for planned early birth.

Chronic hypertension

- Do not deliver before 37 weeks if the BP is lower than 160/110mmHg, with or without anti-hypertensive medication, unless there are medical indications or concerns about fetal wellbeing.
- After 37 weeks, if the BP is lower than 160/110mmHg with or without anti-hypertensives, the timing of delivery should be agreed between the woman and a senior obstetrician, taking into account maternal and fetal indications. Plan for delivery after 39 weeks should be considered.
- Corticosteroids and magnesium sulphate should be given if indicated for planned early birth.

Pre-eclampsia

Before 34 weeks

- Continue surveillance unless there are indications for planned early birth. Offer intravenous magnesium sulphate and a course of antenatal corticosteroids in line with the NICE guideline on preterm labour and birth.

From 34+0 – 36+6 weeks

- Continue surveillance unless there are indications for planned early birth
- When considering the option of planned early birth, take into account the woman's and baby's 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 the NICE guideline on preterm labour and birth.

From 37+0 onwards

- Recommend initiation of birth within 24-48 hours

NB – when a woman is eclamptic a clinical decision may be made that will require delivery at an earlier opportunity. See management of HELLP/AFLP/Eclampsia (LINK)

Vaginal Delivery

- Vaginal prostaglandins will increase the chance of success
- Anti-hypertensive treatment should continue throughout assessment and labour
- If planning for vaginal delivery – consider limiting second stage
- Consideration for an epidural should be made in consultation with the woman

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Postpartum Management Pre-eclampsia and Hypertension

Follow steps

- *BP often drops immediately post delivery, then rises after 48-72 hours*
- *4-6 hourly BP monitoring is recommended in the first 48 - 72 hours*
- *Adjust medications promptly during this period*
- *Ensure patients are discharged on suitable doses to reduce readmissions*

Step 1

Check current antihypertensive:
- Labetalol
- Nifedipine
- Both
- **If on Methyldopa antenatally - should be stopped**

Step 2a

If on Labetalol ≤200mg **BD** or Nifedipine 10mg BD:
- Continue **same** drug
- Do not add Enalapril unless BP ≥150/100 (Start 5mg if required)

Offer women Enalapril explaining that it might mean longer hospital stay
- Monitor BP 4 - 6 hourly

Omit Labetalol/Nifedipine dose if BP less than 135/85*

OR

Step 2b

OR

If on Labetalol ≥200mg **TDS** or Nifedipine more than 10mg BD or higher dose frequency:
- Add Enalapril when due medication after delivery (Start 10mg)
- Continue Labetalol / Nifedipine unless BP less than 135/85 -omit the due dose*
- Monitor BP 4 - 6 hourly
- Increase Enalapril in 5mg's aiming at discharge on Enalapril +/- Nifedipine

Monitoring

For PET - In hospital at least first 2 days:
Discharge if BP less than 135/85 on Enalapril +/- Nifedipine
Bloods (PET) on day 2 or 3 before discharge (if rising may need to stay for review)

Discharge

Plan:
Aim for Enalapril +/- Nifedipine
Continue Labetalol only if needed and low dose (especially if breastfeeding)

Community

Plan: For women with hypertension / PET not medicated
After discharge - Monitor BP daily first 2 days postpartum, if not an inpatient
Repeat on days 3 & 5
GP to review at 2 weeks; taper medication if <130/80
In Community: Refer to triage if BP >150/100
For PET on medication - BP alternative days for two weeks

***For those that are already using HBPM or where/when a machine is available**
In women with **pre-eclampsia** on medication they should be started on HBPM - daily recording for two weeks
Community midwife to collect Machines at two weeks
Review by GP

Evidence Summary

The above process chart acts as general guidance but acknowledges that individualised care should be implemented for all.

Enalapril not first line for Afro-Caribbeans - can be continued on Nifedipine +/- Labetalol
RCT's: Nifedipine faster BP control
Guidelines: Enalapril 1st line Nifedipine 2nd line Labetalol 3rd

Omit Labetalol first (if required) aiming at discharging patient on Enalapril / Nifedipine as less readmission risk and better compliance.

Amlodipine can be used as a postnatal hypertensive if required (5-10milligrams OD)

Complete PIGF testing where indicated

Suitability for home blood pressure monitoring:

1. Hypertensive disorder of pregnancy - follow appropriate table **(antenatal & postpartum)**
2. History of hypertensive disorder in previous pregnancy or chronic kidney disease - for weekly HBPM
3. Suspected PET/PIH - short term monitoring:

Short Term HBPM
Single high BP reading
PET symptoms with normal BP
Significant proteinuria with normal BP
Suspected PET after 36 weeks' gestation

➡ **HBPM three times a week for 2 weeks**

Home Blood Pressure Monitoring (HBPM) Antenatal and Postnatal

The following pages replace the previous stand-alone guideline for Home Blood Pressure Monitoring

Any and all HBPM is reliant on machine availability

Objectives of HBPM

- To align with the NSHE/Trust's strategic objective of adopting digital technology for remote monitoring of patient care
- To reduce inpatient admission for Bp monitoring
- To enhance patient centred care, more patient involvement and increase their sense of control on their own care
- To enable a wider choice of BP surveillance
- To reduce the healthcare costs/workload associated with monitoring of hypertension in pregnancy and postpartum by reducing face-to-face contacts within the community, ANC, DAU and inpatient admissions for blood pressure and urine monitoring during pregnancy and the immediate postnatal period, without compromising maternal and pregnancy outcomes
- To reduce the patient costs, time and inconvenience associated with accessing these services as an outpatient/inpatient for BP monitoring
- To provide an effective solution for white coat hypertension and masked hypertension
  •

Exclusion Criteria

- Women who decline the option of HBPM or prefer healthcare-based BP monitoring.
- Women who require admission under local trust guidelines (e.g., severe hypertension, pre-eclampsia with adverse features such as epigastric pain, vomiting, headache, feeling unwell).
  NB: HBPM can be started if she improves clinically and is appropriate for outpatient care at the discretion of consultant /registrar.
- Women with no access to telephone or who do not understand the written instructions
  - e.g., non-English speaking, learning disability or illiterate.
- Women under difficult social circumstances where compliance might be compromised.
- Evidence of non-compliance with attendance or monitoring.
- Women who are not booked under WHAT and are only reviewed or admitted with high BP.
- Arm circumference greater than 42cm.

If deemed suitable for home blood pressure monitoring by the obstetrician and the woman agrees to partake, patients must be given a clear plan of timings and follow ups.
Risk assessment at booking should clearly identify high risk woman and need for Aspirin, ensuring this is actioned.

Documentation

A clear plan must be documented in the management plan section on BadgerNet. This should include:

Frequency of BP monitoring in line with guidance see above and appropriate table

Duration of BP monitoring

Criteria for discharge from HBPM

Follow up appointment with – ANC or DAU

Implementation and equipment

Implementation to take place on DAU, across Trust any site. See How To guide

Duties and responsibilities of DAU Midwives –

- Ensure that woman's contact details are up to date on Badger (home, mobile phone number, email) and update these as necessary.
- The machines provided to patients are automated machines, which have been validated for pregnancy and pre-eclampsia.
- Woman to be provided with a validated BP monitor and an appropriately sized cuff (check upper arm measurement).

Cuff size	for circumference of upper arm
S	17 - 22 cm (6.75 - 8.75 inches)
M	22 - 32 cm (8.75 - 12.5 inches)
L	32 - 42 cm (12.5 - 16.5 inches)

The blood pressure monitor should be labelled with the name of Worcestershire Acute Hospital Trust and should be recorded on the BP machines folder.

Ensure the woman completes and signs a blood pressure monitor loan form (Appendix 1)

Give leaflet, with rainbow chart (see below) to woman or birthing person with instructions on how to take a blood pressure reading, ensure they understand the leaflet by explaining it with them, giving clear instructions alongside a demonstration and ask the patient to demonstrate the whole process before leaving.

Educate patient on the rainbow chart below ensuring that they understand who to contact with an abnormal reading (DAU 8am – 8pm and maternity triage after 8pm)

Document clearly that this process has taken place.

Postnatal HBPM

1. For anyone with diagnosed pre-eclampsia on medication - commence home blood pressure monitoring daily for two weeks if machine available. Otherwise for alternative daily BP check with community midwife
2. For anyone with PIH antenatally on medication or PET not medicated - twice weekly home blood pressure monitoring for two weeks if machine available, otherwise follow PN plan on chart.

Rainbow Chart

Blood Pressure	Level	Action
Systolic 150 or more or Diastolic 100 or more	**High**	Your blood pressure is high. Sit quietly for 5 minutes then measure it again and note the reading. If your repeated reading is still high please contact maternity traige straight away for review today
Systolic 140-149 or Diastolic 90-99	**Raised**	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 day assessment unit or triage (if out of hours) and continue to monitor your BP daily
Systolic 135-139 or Diastolic 85-89	**High normal**	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 daily
Systolic 110-134 and Diastolic 70-84	**Normal**	Your blood pressure is in the target range. Continue with your current medication and the current plan for home blood pressure monitoring
Systolic less than 109 and Diastolic less than 69	**Low**	**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. Repeat once more in 5 minutes. If your repeat reading is still low, withhold your blood pressure medication and contact DAU within 24 hours or maternity triage urgently if you feel unwell (e.g. dizzy or faint)

Regardless of your blood pressure, contact maternity triage is case of any symptoms including: headache, visual disturbances, nausea and vomiting, upper abdominal pain, fainting or falling, feeling dizzy or lightheaded.

Hospital monitoring of HBPM results

A midwife from DAU will check the HBPM patients list on Badgernet at regular intervals.
The responsibility for actioning an abnormal reading is with the patient.
Once a plan is agreed with the woman, enter plan and discussion on Badgernet.
The BP measurements chart will be reviewed on Badgernet on the patient's follow up appointment.

Returning of monitor

When the decision is made to cease HBPM, ensure that this decision is documented on BadgerNet and any alert is removed, contact the service user and explain the plan for any follow ups and make arrangements to return the monitor.
The machine needs to be returned to DAU after the period of monitoring.
The returned BP machines must be cleaned with Clinell wipes, check all the components are correct (e.g., cuff, connector, batteries), check machine is in working order and records updated that the monitor has been returned.

The blood pressure monitors need to be collected by the community midwife at the first postnatal check - unless HBPM is continuing postnatally and will then be collected at the discharge visit.

Task	Completed
Ensure the woman fits the inclusion criteria	
Woman has opted for HBPM and aware of the healthcare-based BP monitoring	
Check doctors plan for HBPM and ensure frequency of BP monitoring and follow up is recorded	
Ensure patient contact details are up to date on Badger	
Measure the woman's arm circumference to ensure the available cuff is suitable 22-42cm	
Label the monitor with WAHT and record it in the BP monitors folder	
Give leaflet and monitor to patient (leaflet on Badgernet App)	
Complete loan agreement / disclaimer with the patient	
Scan and upload to Badgernet. Paper copy to be filed in the HBPM monitoring folder on DAU for audit and monitoring	
Show the woman how to use BP monitor and record the reading on Badgernet. Ask her to repeat the whole process to make sure she understood.	
Show the patient how to access the rainbow chart on Badger and how to follow it. Make sure she is aware who to contact if BP is abnormal.	
Complete the following in the patients Badger notes: • Add maternal alert that woman is performing HBPM • Set BP range. Critical high 150/100 and target BP – record management plan • Ensure next follow up on DAU is arranged along with next clinic appointment	

Drug Protocols

IV Drug Protocol for Labetalol - regime on delivery suite

Acute Treatment (IV)	Maintenance Treatment (IV)
• 50milligrams IV Bolus over 1 min (10millilitres labetalol 5milligrams/millilitre • Can be repeated every 5 minutes to a maximum of 200milligrams • Can cause excessive bradycardia reversed by giving IV atropine sulphate 600 micrograms - 2.4milligrams in divided doses (max per dose 600micrograms)	• Where continuous IV doses required consider insertion of arterial line in discussion with anaesthetist • Neat Labetalol 5milligrams/millilitre at a rate of 4millilitre/hr via syringe driver • Set target BP and record • Start infusion at 4millilitres/hr and double every 30 minutes to a maximum of 32millilitres/hr (160milligrams) until BP lowered and stabilised at acceptable level • Convert to oral therapy - dose dependant on IV dose that was required
Infusion - Prepare a syringe containing **200milligrams Labetalol** in 40millilitre syringe Commence infusion via syringe driver at 4millilitre/hr (20milligrams/hr) and double rate of infusion every 30 minutes as above. (Max 32millilitres 160milligrams / hr) **Aim to keep systolic BP below 160mmHg and diastolic BP at 90-95mmHg** Monitor BP and pulse as per individual management plan	
If this fails to control BP, or there are any other concerns escalate to consultant obstetrician for further management An IV drug additive label must be completed and attached to the syringe, not obscuring the scale. Label must be visible at all times.	
Clinical monitoring **Continuous** - BP, Pulse, O2 saturations, CTG **Hourly** - Urine output	
Bradycardia reversion - 0.6milligrams Atropine IV up to a maximum of 4 doses.	

Drug Protocol – Nifedipine Modified Release

- Nifedipine MR is the most extensively used calcium channel blocker in pregnancy
- Should be given orally not sublingually
- Nifedipine MR 10milligrams tablets PO to be prescribed stat.
- 10milligrams can be repeated once if no response after 1hr 30mins after initial dose
- Maintenance dose: starting dose 10milligrams BD increasing by 10milligrams BD up to a maximum dose of 40milligrams BD if needed

Side effects - Headaches, flushing, tachycardia, may act as a tocolytic
Do not use with aortic stenosis

There is no evidence of harm to the fetus with Nifedipine, but, in view of limited safety data it is recommended as an alternative to more established treatments only if these are ineffective or contraindicated

Those taking Nifedipine must be warned not to eat grapefruit or drink grapefruit juice

Drug protocol - Hydralazine

Bolus -

Reconstitute a 20milligrams ampoule with 1millilitre water for injection and make up to 10millilitres with normal saline 0.9% to give 2milligrams/millilitre **Give 5milligrams (2.5millilitres) Hydralazine as slow intravenous injection over 3-5 minutes. Check BP every 5 minutes for 30 minutes. The dose can be repeated once more if the required BP is not achieved within 30 minutes (total 1 hour)**

- Consideration should be given to administering 500millilitres crystalloid fluid before or at the same time as the first dose of Hydralazine IV, due to the potential it has for causing maternal hypotension.

Infusion -

- Prepare 40milligrams Hydralazine in 40millilitres of sodium chloride 0.9%.
- Reconstitute each 20milligrams ampoule with 1millilitre of water for injection then make the 2millilitres (40milligrams) up to 40millilitres with Sodium Chloride 0.9% in a 50millilitres syringe to give a concentration of 1milligrams/millilitre.
- Commence infusion via syringe driver at 4millilitres/hr (4milligrams/hr) and increase the rate by 4millilitres per hour at 30 minute intervals to a maximum rate of infusion of 20millilitres/hr (20milligrams/hr) until satisfactory response obtained.

i.e. Systolic BP <160mmHg / Diastolic BP of 90mmHg

If this fails to control BP or for any other concerns, escalate to consultant obstetrician for further management.

An IV drug additive label must be completed and attached to the syringe, not obscuring the scale. This label must be visible at all times.

Those taking Nifedipine must be warned not to eat grapefruit or drink grapefruit juice

Appendix 1

Blood Pressure Monitor Loan Form and Disclaimer

I have opted for self-monitoring of my blood pressure, and I hereby accept the responsibility for:

- Monitoring my blood pressure as instructed below and recording it on the BadgerNet App.
- Reporting to the Day Assessment Unit if the monitor becomes damaged, lost or stolen. I am not responsible for the cost of replacement or repair.
- Returning the blood pressure monitor as requested.

Name	
Hospital Number	
Date of Birth	
Patient signature	
Staff name	
Staff signature	
Date	
Monitor number	
Cuff size	

For any concerns, please contact the Day Assessment Unit on 01905 760594

MONITORING INSTRUCTIONS

Check your Blood Pressure as follows:

Days (please circle) - **Mon / Tues / Weds / Thurs / Fri / Sat / Sun**

Frequency: Three times a week / Twice weekly / Weekly / 2 weekly / 4 weekly

Other - (please specify) _____

Target BP: - _____

Duration of BP/Urine monitoring (please circle):

For entire pregnancy / 21 days / other (please specify) - _____

Blood Pressure Monitor Returned:

Date: _____

Signed: _____

Monitoring

Page/ Section of Key Document	Key control:	Checks to be carried out to confirm compliance with the Policy:	How often the check will be carried out:	Responsible for carrying out the check:	Results of check reported to: (Responsible for also ensuring actions are developed to address any areas of non-compliance)	Frequency of reporting:
	WHAT?	HOW?	WHEN?	WHO?	WHERE?	WHEN?
	Triage Admissions with Hypertension	Badgernet	Monthly	Senior MW	W2B report	Monthly
	Postnatal discharge letters	Badgernet	Monthly	Senior MW	W2B report	Monthly

Contribution List

This key document has been circulated to the following individuals for consultation:

Designation
Maternity Governance Meeting
All Maternity Staff

This key document has been circulated to the chair(s) of the following committee's / groups for comments:

Committee
Maternity Governance Meeting