Hypertension in Pregnancy
(including Chronic Hypertension and Pre-Eclampsia)

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, Pregnancy Induced Hypertension and Pre-Eclampsia.

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.

Home Blood pressure monitoring criteria and guidance can be found:
Home Blood Pressure Monitoring (HBPM) in pregnancy guideline

This guideline is for use by the following staff groups:

All staff responsible for detecting, diagnosing and treating hypertensive disorders in pregnancy.

Lead Clinician(s)

Prabath Suraweera	Consultant Obstetrician
Laura Veal	Consultant Obstetrician
Daisy Bradley	Lead Guidelines Midwife
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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

Contents

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 auto-regulation 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.

Reducing the risk of PET (Risk Assessment)

See Aspirin SOP.

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 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* *150mg PO/OD/nocte from 12-delivery*
Pre-Eclampsia **Moderate**	• First pregnancy • Maternal age (>40yrs at booking) • Inter-pregnancy interval >10 years • BMI >35 at booking • Family history of pre-eclampsia in first degree relative • Multiple pregnancy	*Low dose Aspirin in 2 or more moderate risk factors* *150mg PO/OD/nocte from 12-delivery*

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

What is Hypertension in pregnancy?
Women with hypertensive disorders of pregnancy have been subdivided as follows:

Gestational hypertension (PIH)	New hypertension after twenty weeks of pregnancy.
Chronic hypertension	History of hypertension pre-conception / before 20 weeks of pregnancy or hypertension that fails to resolve postnatally. **If hypertension is identified at booking, the chronic hypertension pathway should be followed**
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.
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.

According to the NICE Guidelines, 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

Urinalysis, PCR and blood tests for hypertension in pregnancy
All women should be offered urinalysis at each antenatal appointment. This should test for proteinuria, to be able to aid in decision making when there are signs and symptoms of pre-eclampsia and/or identified hypertension. *First morning urine void should not be used to identify 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 woman.*

If the PCR result is **30mg/mmol or more,** this is classed 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 diagnosis of pre-eclampsia.

Anti-Hypertensive medication in Pregnancy
The following medications should be considered in the treatment of hypertension in pregnancy:

- Labetalol
- Nifedipine - if labetalol is not suitable
- Methyldopa - if both labetalol and nifedipine are not suitable.
- Enalapril – In the postnatal Period

Pre-existing treatment in chronic hypertension, side-effects, risks and maternal preference should be considered when making a choice about medication

If a woman has taken methyldopa to treat chronic hypertension during pregnancy, stop within 2 days after the birth and change to an alternative antihypertensive treatment.

In WAHT the preferred therapeutic agents for acute management of severe hypertension in pregnancy are:

1st Line Treatment	**Labetalol -** given orally or intravenously (Appendix 3 & 4).
	Nifedipine and Methyldopa – consider as alternatives if there are contra indications to using labetalol like asthma (Appendix 3 &5).
2nd Line Treatment	**Hydralazine** – intravenous If first line treatment is unsuccessful/contraindicated (Appendix 3 & 6).
* Caution**:** All three drugs have cumulative effect and interact with magnesium sulphate. Nifedipine increases the muscular blockade of magnesium sulphate.	

Maintenance Treatment
Long-term treatment should be started at the same time:

- **Women already on treatment** may need an increment in existing doses or an addition of another antihypertensive. This should be discussed with the on-call consultant.
- In pregnant women with uncomplicated chronic hypertension treatment should be initiated if the BP is 140/90 mmHg or higher aiming for a BP of 135/85 mmHg or less. Do not offer pregnant women with uncomplicated chronic hypertension treatment to lower diastolic blood pressure below 80 mmHg.
- Offer pregnant women with secondary chronic hypertension referral to a specialist in hypertensive disorders.
- **Labetalol** can be increased to a maximum of 600 milligrams QDS (2400 milligrams daily).
- **Nifedipine MR** Tablets (modified release) should be prescribed, to lower the BP in the short term and their current medication should be increased. Nifedipine MR may need to be added as a maintenance treatment (see appendix 5) and can be increased up to a maximum of 40milligrams BD.
- **Methyldopa** can be increased up to a maximum of 750 milligrams QDS. More commonly Nifedipine is added if the BP is not adequately controlled on Methyldopa 500milligrams QDS, because of the sedative effects of higher doses of Methyldopa. This should be stopped postnatally due to the risk of depression.

Women not already on treatment
Labetalol and Nifedipine are the most used therapies in the WAHT.

Labetalol – the normal dose as per NICE guidelines is 200 milligrams BD orally, increased as above if necessary.

Contraindications: asthma, heart failure. cardiogenic shock, hypotension, marked bradycardia, metabolic acidosis, phaeochromocytoma (apart from specific use with alpha-blockers), Prinzmetal's angina, second-degree AV block, severe peripheral arterial disease, sick sinus syndrome, third-degree AV block

Side effects - Abdominal discomfort, bradycardia, confusion, depression, diarrhea, dizziness, dry eye (reversible on discontinuation), dyspnea, fatigue, headache, heart failure, nausea and vomiting, paresthesia, peripheral coldness, PVD, rash (reversible on discontinuation), sleep disorders, syncope, visual impairment

Or

Nifedipine MR – 10milligrams BD, increased as above if necessary

Contraindications: Acute attacks of angina, cardiogenic shock, significant aortic stenosis, unstable angina, within 1 month of an MI

Side effects – Constipation, malaise, oedema, and vasodilation are the commonest side effects but many women also report headaches

Antihypertensive drugs to avoid:

- **Atenolol** should be avoided, as there is some evidence that its use may be linked to fetal growth retardation when given in early pregnancy. Other beta-blockers are seldom used, as there is little data on their safety during pregnancy.
- **ACE inhibitors and angiotensin II receptor antagonists (ARB**) must not be used during pregnancy. There is an increased risk of congenital abnormalities if these drugs are taken during pregnancy. ACE inhibitors when taken during the second and third trimester cause fetal renal dysfunction, with oligohydramnios, intrauterine death, and neonatal death from renal failure. There is little data on the effects of ARB, but adverse effects are likely to be similar to those of ACE inhibitors. Accidental exposure of the fetus 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.

Postnatal Hypertensive Treatment

Offer enalapril to treat hypertension in women during the postnatal period, with appropriate monitoring of maternal renal function and maternal serum potassium.

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.

Chronic Hypertension

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 medications should be documented and assessment for suitability in pregnancy should be arranged with the GP if this has not already taken place.

Referral

If chronic hypertension is identified for the first time at the booking appointment, this should be referred to both the GP for initial management and the antenatal clinic for consultant led care.

If the chronic hypertension is known and the woman is under primary care already, then only a referral into the antenatal clinic is required. If the woman has not had contact with the GP in this pregnancy to assess her treatment suitability, this should be arranged.

Treatment

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.

Offer antihypertensive treatment to pregnant women who have chronic 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

When using medicines to treat hypertension in pregnancy, aim for a target blood pressure of 135/85 mmHg.

If the BP is well controlled: monitoring should take place with blood pressure measurements every 2-4 weeks

If it is poorly controlled: consider weekly BP measurements with the community midwife or DAU.

Appointment Schedule

Antenatal appointments should take place as routine between midwife and consultant, additional appointments should be scheduled according to individual needs of the woman and her baby. Such as:

- **If the BP is well controlled:** monitoring should take place with blood pressure measurements every 2-4 weeks

- **If it is poorly controlled:** consider weekly BP measurements with the community midwife or DAU.

Timing of Birth

Do not deliver before 37 weeks if the BP is lower than 160/110 mmHg, with or without anti-hypertensive, unless there are medical indications or concerns about fetal wellbeing.

If the BP is lower than 160/110 mmHg with or without antihypertensives after 37 weeks, the timing of delivery and maternal and fetal indications should be agreed between the woman and a senior obstetrician.

Postnatal Care and Treatment

- Check BP daily for the first 2 days
- Check the BP at least once between days 3-5 days or as clinically indicated
- Aim to keep BP lower than 140/90 mmHg
- Offer a medication review with a GP or specialist at 2 weeks
- Advise woman she should have a blood pressure review at her 6–8-week appointment with her GP.

Gestational Hypertension

Assessment and Treatment (inc. referral criteria)

Full assessment should take place if any woman presents with a BP of 140/90mmHg or above.

For all women:

- Take blood pressure profile (3 x BP, 5 minutes apart) to confirm blood pressure.
- Perform urinalysis to check for proteinuria

- Ask about signs and symptoms of pre-eclampsia

If this measurement is taken in community:

- Refer into Triage for a full assessment with an obstetric doctor
- Reassure woman
- If ++ proteinuria or above 160/110mmHg **consider** transport via ambulance if unwell.

If this measurement is taken in Triage/Antenatal Ward:

- Escalate to the obstetric team for review
- Follow the process in Appendix 1: Management of pregnancy with gestational hypertension (NICE NG133)

Carry out a full clinical assessment at each antenatal appointment 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 or higher
- Any maternal biochemical or haematological investigations that cause concern, for example, a new and persistent:
- Rise in creatinine (90 micromol/litre or more, 1 mg/100 ml or more) or
- Rise in alanine transaminase (over 70 IU/litre, or twice upper limit of normal range) or
- Fall in platelet count (under 150,000/microlitre)
- 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.

Timing of Birth

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

Postnatal Care and Treatment

- Check BP daily for the first 2 days.
- Check the BP at least once between days 3-5 or as clinically indicated.
- Continue Anti-hypertensive medication.
- Reduce medication if BP falls below 130/80 mmHg.
- Start antihypertensive treatment if the BP goes above 150/100 mmHg and the woman has previously been unmedicated. See Anti-Hypertensive medication in Pregnancy
- Offer women on medication a review at 2 weeks with either a GP or a specialist.

- Advise woman she should have a blood pressure review at her 6–8-week appointment with her GP.

Write a care plan for women with gestational hypertension who have given birth and are being transferred to community care that includes all the following:

- Who will provide follow-up care, including medical review if needed.
- Frequency of blood pressure monitoring needed.
- Thresholds for reducing or stopping treatment.
- Indications for referral to primary care for blood pressure review.
-

Pre-Eclampsia
Assessment
Assessment of Pre-Eclampsia should be undertaken by a midwife or obstetrician. The signs and symptoms of pre-eclampsia include the following:

Symptoms
- Severe headache
- Epigastric pain and/or vomiting.
- Visual disturbance
- Significant swelling of face, hands, feet
- Bleeding per vagina

Signs
- Clonus >1 beat
- Papilledema on fundoscopy
- Fetal condition / (CTG)
- Liver tenderness

If you suspect a pre-eclampsia diagnosis, the following steps should be taken:

For all women:
- Retake Blood Pressure to confirm reading
- Perform urinalysis to check for proteinuria.

If BP is below 140/90:
- Consider sending PET Screening Bloods (cross-reference to section)
- Send PCR if 2+ or above proteinuria.
- Provide safety netting advice for woman, explain signs and symptoms, and direct to triage if any concerns.
- **Follow up results the next day.**

If BP is 140/90mmHg or above:

If this measurement is taken in community:
- Refer into Triage for a full assessment with an obstetric doctor
- Reassure woman
- If ++ proteinuria or above 160/110mmHg **consider** transport via ambulance if unwell.

If this measurement is taken in Triage/Antenatal Ward:
- Escalate to the obstetric team for review
- Follow the process in Appendix 2: Management of pregnancy with pre-eclampsia (NICE NG133)

Treatment and management

Women with Pre-eclampsia who have a BP reading of **140/90 – 159/109 mmHg** should be admitted if there are any concerns for the wellbeing of the woman or baby.

- Treatment should be commenced if the BP is 140/90 mmHg or higher, aiming for a BP of 135/85 or less.
- Check the BP every 48 hours when an outpatient, this should be handed over to the community team and the woman should be aware of the blood pressure regime.
- If the woman is admitted, frequent BP checks should take place – these should be outlined within the care plan made at the point of admission.
- Perform blood tests twice a week.
- Repeat the urine dipstick only if there is uncertainty in the diagnosis or it is clinically indicated.

Women with BP of **160/110 mmHg or above** need to be admitted and have blood pressure checks at least 4 times a day.

- Start treatment aiming for a BP of less than 135/85 mmHg.
- Check BP every 15-30 minutes until it is less than 160/110 mmHg then at least four times a day.
- Perform blood tests as indicated but at least twice a week. **These should be performed in DAU**.
- Repeat the urine dipstick only if there is uncertainty in the diagnosis or it is clinically indicated.

See Appendix 2 for further information regarding the management of pre-eclampsia.

Fluid Balance

Fluid input and output should be recorded on a fluid balance chart for all women with pre-eclampsia. The principles laid out in Fluid Balance and Hyponatraemia in Labour and the Immediate Postpartum Period should be followed.

Severe Pre-eclampsia may be treated with a fluid restriction of 80mls/hr, however this should be documented and reviewed in the care plan on Badgernet by and obstetrician.

Timing of Birth

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.

Involve Senior Obstetrician in decision making around timing of birth, and inform the anaesthetic team if birth is planned in a woman with pre-eclampsia.

The neonatal team should be informed if there are anticipated neonatal concerns and birth is planned.

Use the table below to aide management of pre-eclampsia:

Weeks of Pregnancy	Timing of Birth
Before 34 Weeks	Continue surveillance unless there are indications for planned early birth. Offer intravenous magnesium sulfate and a course of antenatal corticosteroids in line with the NICE guideline on preterm labour and birth.
From 34 weeks to 36 weeks plus 6 days	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. 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.
37 weeks onwards	Initiate birth within 24 to 48 hours.

Postnatal Care and Treatment

In women with pre-eclampsia who **did not take antihypertensive medication** and have given 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 to 5.

Start antihypertensive medication if blood pressure is 150/100 mmHg or higher. Enquiries should be made about severe headache and epigastric pain each time blood pressure is measured.

All women with PET should be added to the consultant book for review on the postnatal ward.

In women with pre-eclampsia who **took antihypertensive treatment** and have given birth, measure blood pressure:

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

Continue antihypertensive treatment within the below parameters:

- Consider reducing antihypertensive treatment if their blood pressure falls below 140/90 mmHg
- Reduce antihypertensive treatment if their blood pressure falls below 130/80 mmHg.

Offer all women with pre-eclampsia who have given birth transfer to community care if all of the following criteria have been met:

- There are no symptoms of pre-eclampsia
- Blood pressure, with or without treatment, is 150/100 mmhg or less
- Blood test results are stable or improving.
- In women who have pre-eclampsia with mild or moderate hypertension, or after step-down from critical care:
    - Measure platelet count, transaminases and serum creatinine 48 to 72 hours after birth or step-down
    - Do not repeat platelet count, transaminases or serum creatinine measurements if results are normal at 48 to 72 hours.
    - If abnormal results are found, repeat measurements until they return to normal.

Write a care plan for women with pre-eclampsia who have given birth and are being transferred to community care that includes all the following:

- 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.

All women who have had preeclampsia should arrange:

- If on medication, a review at 2 weeks with either a GP or a specialist.
- Blood pressure review at her 6–8-week appointment with her GP, which should include urinalysis; if proteinuria (1+ protein or more), further review should be arranged for 3 months to assess kidney function.

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. These women 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%)

Haematological and biochemical monitoring

- Full blood count, PET profile (See PET chart). These tests should be performed at presentation and then weekly.
- Clotting studies including fibrinogen levels are required if the platelet count is less than 100 x 10^6/l.
- Urinalysis – if 1+ proteinuria check PCR, if >30 mg/mmol inform medical staff (see below).

Preterm Delivery (all Hypertension)
If preterm delivery is required, steroids and magnesium sulphate should be offered and peri-prem pathway commenced if indicated.

Neonatal Management
If Labetalol has been administered in pregnancy/labour, Blood Sugar monitoring should be commenced as per usual protocol.

If breastfeeding, explain:

- Medications can pass into milk however most medications only lead to low quantities within the milk.
- When discharged home advise women to monitor their babies for drowsiness, lethargy, pallor, cold peripheries or poor feeding.
- Aim to avoid diuretics or ARBs.
- Further information on the safety of medications in breastfeeding is available from Medicines Information: Ext 45776

Pre conceptual counselling
This should be offered where the events that occurred, any risk factors and any preventative therapies can be discussed. It is particularly important for those women in whom their hypertension led to a birth at less than 34 weeks gestation.
Low-dose aspirin have moderate benefits when used for prevention of pre-eclampsia and its consequences. Antiplatelets are associated with an 8% reduction in the relative risk of preterm birth, a 14% reduction in fetal or neonatal deaths and a 10% reduction in small-for-gestational age babies. Women who take angiotensin-converting enzyme (ACE) inhibitors and angiotensin II receptor blockers (ARBs) must be advised that there is an increased risk of congenital abnormalities if these drugs are taken during pregnancy.

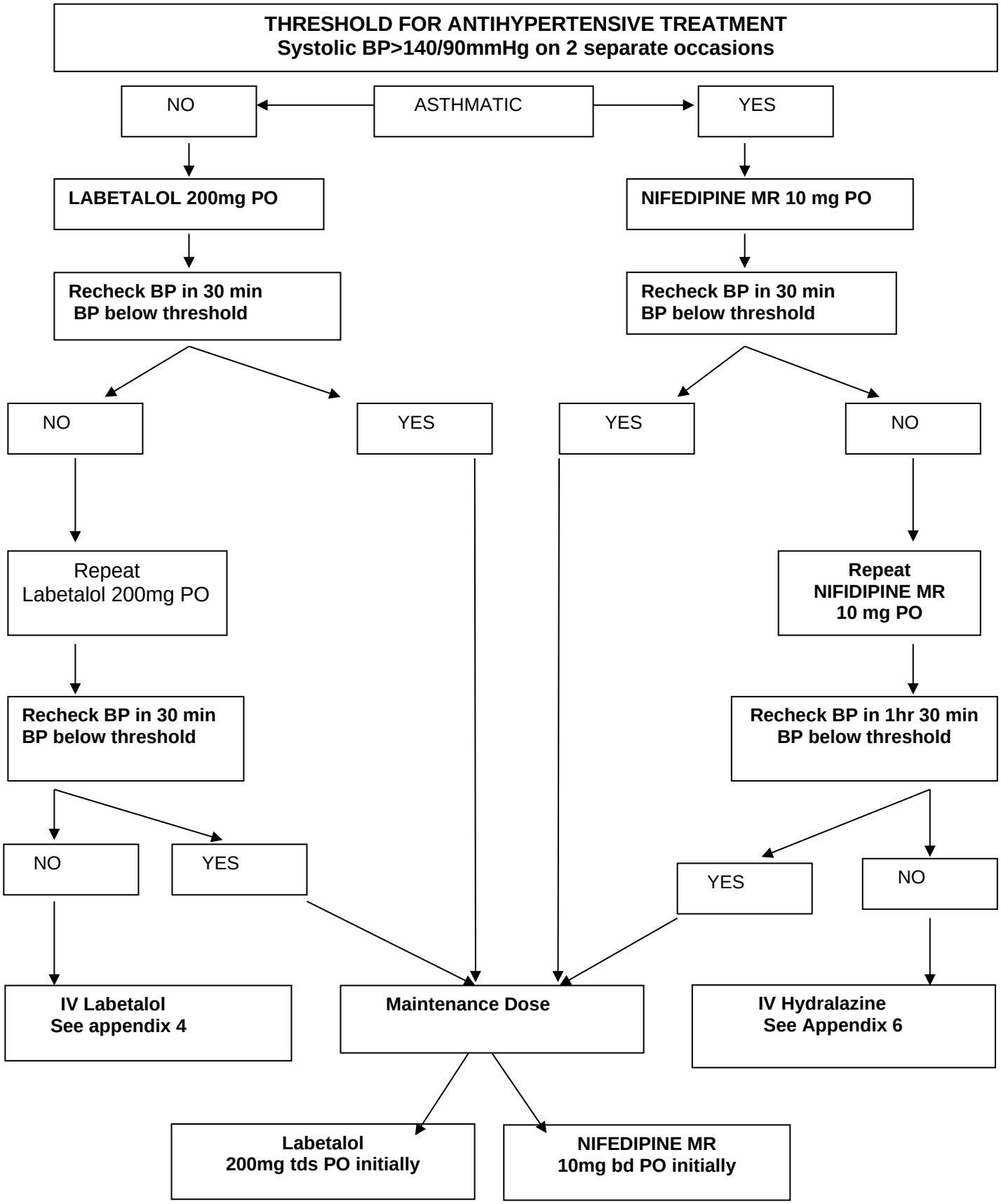
Appendix 1: Management of pregnancy with gestational hypertension (NICE NG133)

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

Appendix 2: Management of pregnancy with pre-eclampsia (NICE NG133)

Management	Hypertension: *(140/90–159/109 mmHg)*	Severe hypertension: *160/110 mmHg 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, but if BP falls below 160/110 mmHg, then manage as for hypertension
Antihypertensive pharmacological treatment	Offer pharmacological treatment if BP remains above 140/90 mmHg	Offer pharmacological treatment to all women
Target blood pressure once on antihypertensive treatment	Aim for BP of 135/85 mmHg or less	Aim for BP of 135/85 mmHg or less
Blood pressure measurement	Once or twice a week (depending on BP) until BP is 135/85 mmHg or less	Every 15–30 minutes until BP is less than 160/110 mmHg, then at least 4 times daily while the woman is an inpatient, depending on clinical circumstances
Dipstick proteinuria testing	Once or twice a week (with BP measurement)	Only repeat if clinically indicated, for example, if new symptoms develop or if there is uncertainty over diagnosis
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
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	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

Appendix 3: Medication Regimes



Appendix 4: IV Drug protocol for Labetalol

Labetalol regime on Delivery Suite

Oral therapy 200mg stat with further 200mg after 1 hr

Acute Treatment (IV)	Maintenance Treatment (IV)
• 50mg IV Bolus over 1 min (10mL labetalol 5mg/mL) • Can be repeated every 5 min to a **maximum** of 200mg • Can cause excessive bradycardia reversed by giving IV atropine sulphate 600 micrograms – 2.4mg in divided doses (max per dose 600 micrograms)	• Where continuous IV doses required, consider insertion of arterial line in discussion with anaesthetist • Neat labetolol 5mg/mL at a rate of 4ml/hr via syringe driver • Set target BP and record • Start infusion at 4 mL/hr and double every 30 min to maximum 32 mL/hr (160mg) until BP lowered and stabilised at acceptable level • Start at • 4 mL/hr (double every 30 min if necessary) • 8 mL/hr • 16 mL/hr • 32 mL/hr (maximum) • Convert to oral therapy – dose dependant on IV dose that was required

Infusion

Prepare a syringe containing **200mg Labetalol** in 40ml syringe.

Commence infusion via syringe driver at 4ml/hr (20mg / hr) and double rate of infusion every 30 mins to a maximum dose of 32ml/hr (160mg) until required BP achieved.

Aim to keep systolic BP below 160mm Hg and diastolic BP at 90 - 95 mm Hg.

- Monitor BP and Pulse as per individual management plan

If this fails to control BP, or there are any other concerns, inform Consultant Obstetrician for advice regarding 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.

Clinical monitoring

Continuous BP
Pulse
0_2 saturation
CTG

Hourly Urine output

Bradycardia induced by Labetalol can be treated with 0.6mg Atropine IV up to a maximum of 4 doses.

Appendix 5: Drug protocol NIFEDIPINE

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

Side Effects

- Headaches
- Flushing
- Tachycardia
- Do not use with aortic stenosis
- May act as tocolytic

There is no evidence of harm to the fetus from 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.

NB Women on Nifedipine should be warned not to take grapefruit or grapefruit juice

Appendix 6: Drug protocol for Hydralazine

Bolus

Reconstitute a 20mg ampoule with 1ml of water for injection and make up to 10ml with normal saline 0.9% to give 2mg/1mL. Give 5mg (2.5ml) Hydralazine as slow intravenous injection over 3-5mins check BP every 5mins for 30mins the dose can be repeated once again if the required BP is not achieved within 30 mins (Total 1 hour)

Consideration should be given to administering 500mL 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 40mg Hydralazine in 40ml of sodium chloride 0.9%. Reconstitute each 20mg ampoule with 1ml of water for injection then make the 2ml (40mg) up to 40ml with sodium chloride 0.9% in a 50ml syringe to give a concentration of 1mg/mL

Commence infusion via syringe driver at 4ml/hr (4mg/hr) and increase rate by 4ml/hr at 30 minute intervals to a maximum rate of infusion of 20ml/hr (20mg/hr) until satisfactory response obtained i.e. systolic BP <160mmHg / diastolic BP of 90 – 95mmHg.

If this fails to control BP, or there are any other concerns, inform Consultant Obstetrician for advice regarding 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.

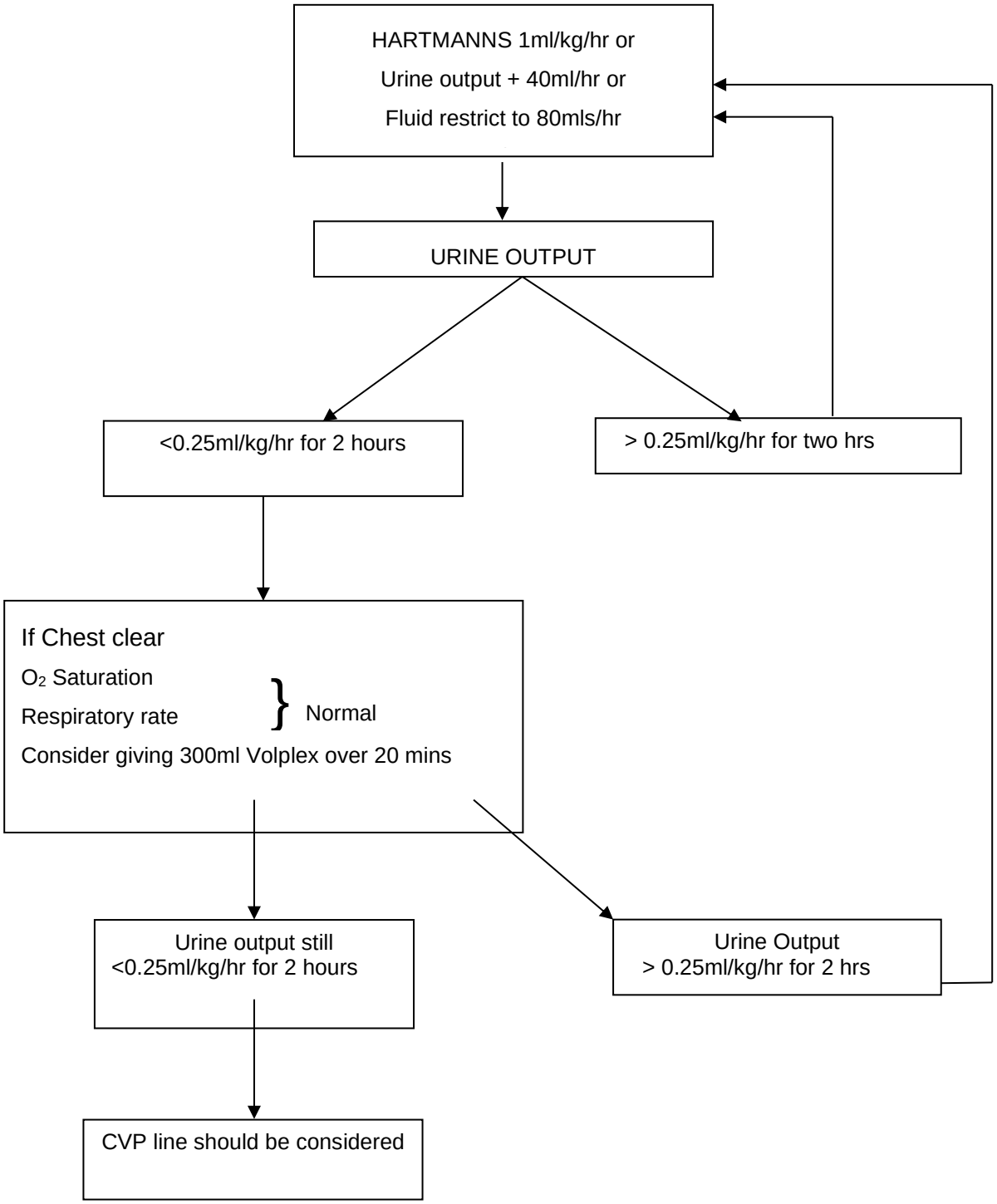
Clinical Monitoring

Continuous	BP Pulse 0_2 saturation Fetal Monitoring by CTG
Hourly	Urine output

Side Effects

- Tachycardia
- Hyper–reflexia
- Nausea
- Vomiting
- Headaches
- Flushing
- Diarrhoea
- Joint pain

Appendix 7: Fluid balance in severe pre-eclampsia / eclampsia



Appendix 8: Blood reference Values

Please attach patient sticker here or record:

Name:……

Unit No:

NHS No:

D.O.B: ……/……/……

Gender: Female/Male Cons: …… ….

Worcestershire NHS
Acute Hospitals NHS Trust

TESTS	Reference values in pregnancy (3rd trimester)								
Hb	11 – 14 g/dl								
WCC	6 – 16 $X10^9$/l								
Platelets	150 - 400 $X10^9$/l								
Urea	0 – 8.3 mmol/l								
Creatinine	44 – 80 µmol/l								
Potassium	3.5 – 5.3mmol/l								
Sodium	132-148 mmol/l								
Uric acid	140-360 µmol/l								
PCR	<30 mg/mmol/l								
ALT	0 – 40 iu/l								
Alk phos	133 – 418 iu/l								
Bilirubin	0 – 17 mmol/l								
T.Protein	60 – 80 g/l								
Albumin	35 - 50 g/l								
LDH	200-520iu/L								
OTHERS									

Appendix 9: Primary care Management of Postnatal PIH

PRIMARY CARE MANAGEMENT OF POSTNATAL PREGNANCY INDUCED HYPERTENSION

TARGET BP < 140/90mmHg

All patients should have a senior medical review and medical discharge written and sent to GP prior to discharge. This should include frequency of BP monitoring, plan for repeating bloods if indicated, thresholds for reducing or stopping treatment and indications for referral to secondary care

COMMUNITY/CMW and GP

BP check between Day 3 – 5 or as clinically indicated by CMW

BP < 130/80mmHg reduce medication

BP≥140/90mmHg Optimise medication

BP≥150/100mmHg Commence/increase medication

Refer to Maternity Triage

GP

Medication review at 2 weeks with GP for those still taking anti-hypertensives

BP<130/80mmHg

BP≥140/90mmHg

BP≥150/100mmHg Commence/increase medication

Refer to Maternity Triage

Reduce medication

Optimise medication

Medical review at 6-8 weeks with GP

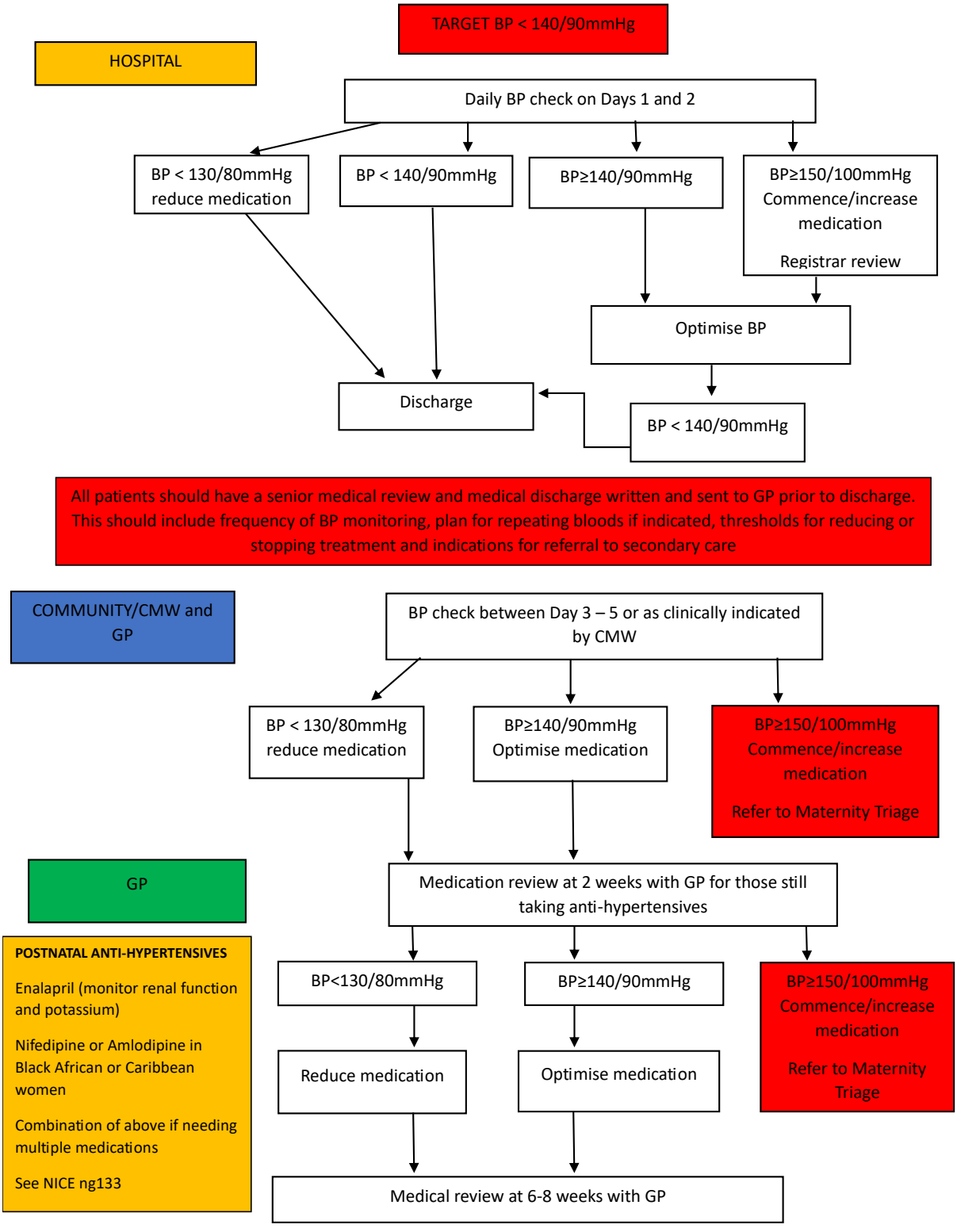
POSTNATAL ANTI-HYPERTENSIVES

- Enalapril (monitor renal function and potassium)
- Nifedipine or Amlodipine in Black African or Caribbean women
- Combination of above if needing multiple medications

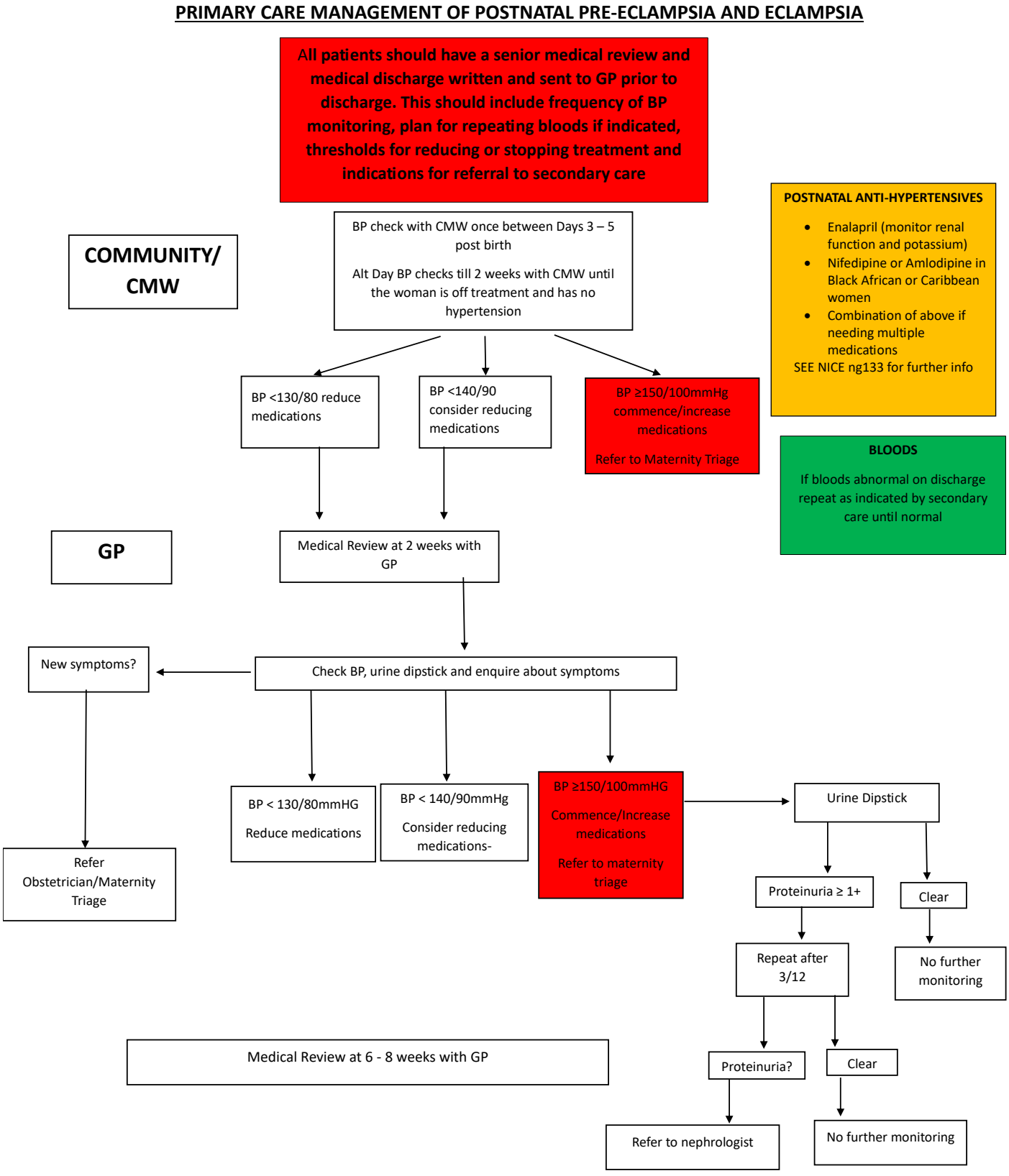
SEE NICE ng133 for further info

Appendix 10: Postnatal management of PIH in Primary and Secondary Care

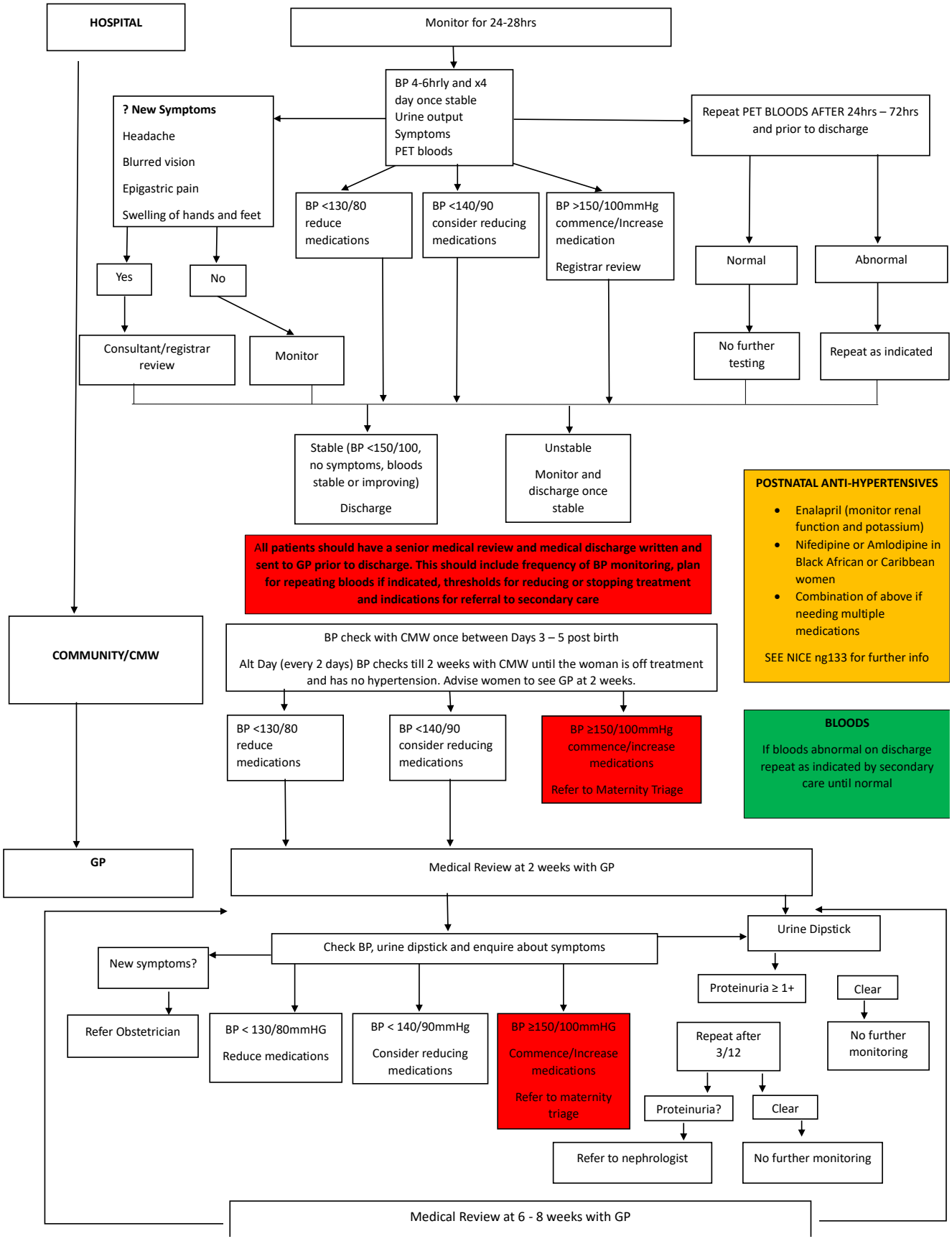
POSTNATAL MANAGEMENT OF PREGNANCY INDUCED HYPERTENSION IN PRIMARY AND SECONDARY CARE



Appendix 11: Primary Care Management of Postnatal PET and Eclampsia



POSTNATAL MANAGEMENT OF PRE-ECLAMPSIA AND ECLAMPSIA IN PRIMARY AND SECONDARY CARE



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 Reports	Monthly	Senior MW	Maternity Governance	Monthly
	Postnatal Discharge letters	Badgernet Reports	Monthly	Senior MW	Maternity Governance	Monthly

Contribution List

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

Designation

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

Committee
Maternity Quality Governance Meeting

	Title of document: Hypertension in Pregnancy (including CH and PE) V8	Yes/No
1.	Does the implementation of this document require any additional Capital resources	Yes – BP Monitors
2.	Does the implementation of this document require additional revenue	Yes - CNST/SBL Funding
3.	Does the implementation of this document require additional manpower	No
4.	Does the implementation of this document release any manpower costs through a change in practice	No
5.	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff	No
	Other comments:	All funded through SBL Workstream