University Hospitals Sussex
NHS Foundation Trust

Hypertension and preeclampsia in pregnancy

Maternity Protocol: MP019

Date agreed: April 2022

Author:	Win Khine
Version:	3
Approval Committee:	Women's Safety and Quality Committee
Date agreed:	April 2022
Amended date:	
Review date:	April 2025 (MGC 2023)
Cross reference:	**MP001** Provision & Schedule of Antenatal Care **MP056** High Dependency Care (HDU)

Contents

Key Principles:

A protocol is a set of measurable, objective standards to determine a course of action.

Professional judgement may be used in the application of a protocol.

Scope:

This protocol applies to:

- All pregnant women/people with Hypertensive Disease

Responsibilities:

Midwives & Obstetricians:

- To access, read, understand and follow this guidance
- To use their professional judgement in application of this protocol

Management Team:

- To ensure the protocol is reviewed as required in line with Trust and National recommendations
- To ensure the protocol is accessible to all relevant staff

Section 1

1 Definitions

1.1 Hypertension

Systolic over 140mmHg on two separate occasions (within same week) in pregnancy (NB systolic of ≥150 requires immediate treatment and ≥180 is a medical emergency - CMACE 2011) Diastolic over 90mmHg on two separate occasions in pregnancy

1.2 Pre-existing hypertension

Women/people with hypertension at the booking appointment or before 20 weeks of pregnancy.

1.3 Gestational hypertension

New-onset hypertension presenting after 20 weeks of pregnancy. It can occur in isolation, or in association with proteinuria when it is known as pre-eclampsia.

1.4 Pre-eclampsia

Raised BP on 2 occasions at > 20/40 gestation with significant proteinuria.

Pre-eclampsia is a multisystem disorder that can affect almost all maternal organ systems and the unborn baby.

Women/people with either pre-existing hypertension or gestational hypertension are at increased risk of developing pre-eclampsia.

1.5 Eclampsia

Pre-eclampsia becomes eclampsia when the mother develops seizures.

1.6 HELLP Syndrome (Hemolysis, Elevated Liver enzymes, Low Platelets)

It represents a subtype of preeclampsia with severe features in which haemolysis, elevated liver enzymes, and thrombocytopenia are the predominant features, rather than hypertension or central nervous system or renal dysfunction, although the latter do occur. The majority of patients, but not all, have hypertension (82 to 88 percent) and/or proteinuria (86 to 100 percent)

1.7 Preeclampsia superimposed upon pre-existing hypertension

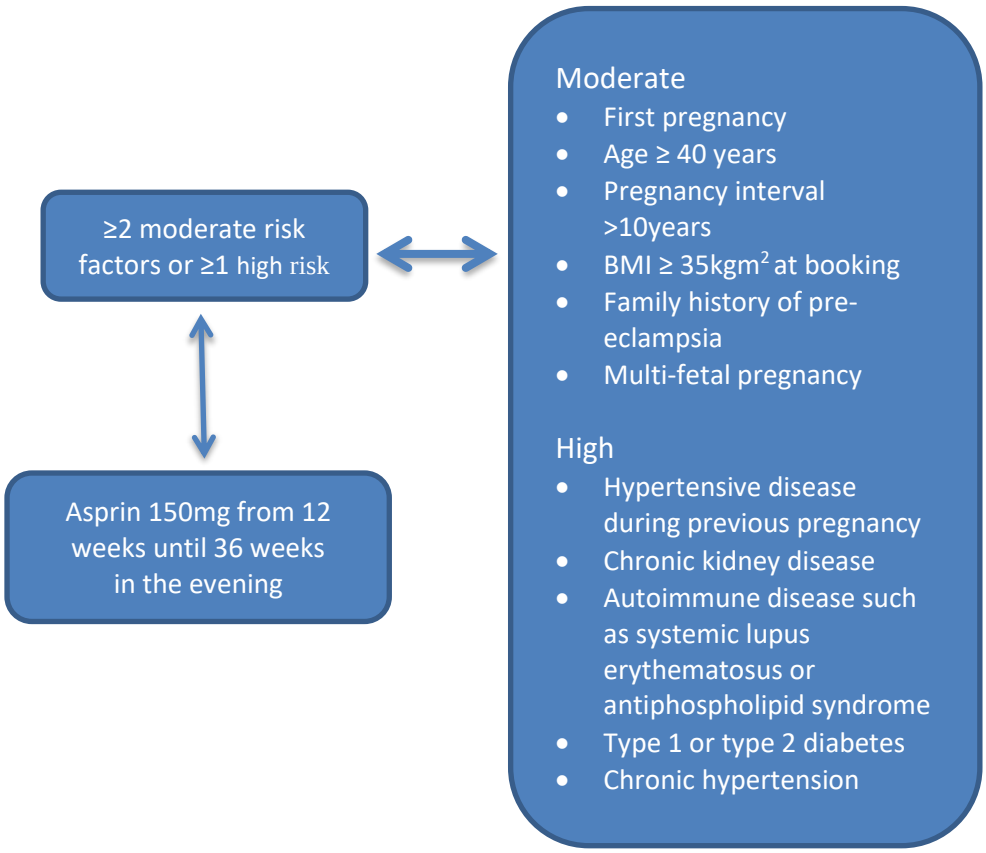
Superimposed preeclampsia is defined by the new onset of proteinuria, significant end-organ dysfunction, or both after 20 weeks of gestation in a woman with pre-existing hypertension.

For women/people with pre-existing hypertension who have proteinuria prior to or in early pregnancy, superimposed preeclampsia is defined by worsening or resistant hypertension (especially acutely) in the last half of pregnancy or development of signs/symptoms of the severe end of the disease spectrum.

Section 2: Hypertension

2 Antenatal Management of Women/people with a Previous History of hypertensive disease during pregnancy or at High Risk of Pre-Eclampsia

2.1 Risk assessment and Antiplatelet agent (150mg Asprin)



2.2 Assessment of proteinuria in hypertensive disorders of pregnancy

2.2.1 If dipstick screening is positive (1+ or more), use protein: creatinine ratio to quantify proteinuria in pregnant women/people. Do not use first morning urine void to quantify proteinuria in pregnant women/people.

2.2.2 Do not routinely use 24-hour urine collection to quantify proteinuria in pregnant women/people.

2.2.3 Use protein creatinine ratio of 30mg/mmol as a threshold for significant proteinuria

If the result is 30mg/mmol or above and there is still uncertainty about the diagnosis of pre-eclampsia, consider re-testing on a new sample, alongside clinical review.

3 Antenatal referrals and management

Women/people who are identified at the initial booking visit as being at high risk or having more than one moderate risk factor, should be referred immediately to a consultant-led antenatal clinic for further assessment.

They should be seen in the clinic as soon as possible after the initial visit, but by 20 weeks gestation at the latest.

In the consultant-led clinic, an individualised plan of care will be made on a case-to-case basis and documented in the handheld maternity notes, including a decision about the need for antenatal aspirin

4 Referral / Management Guidance for Midwives in Antenatal Clinic Setting

4.1 If a midwife has concerns about a BP they should ensure that the BP is taken using a manual sphygmomanometer and an appropriate sized cuff. (Please see Appendix A for information on how the BP should be taken)

4.2 Midwives can refer by directly contacting the DAU at either hospital site during DAU opening hours; outside of these times e.g. weekends, the labour ward coordinator on duty should be contacted to organise a review.

- Two BP readings within one week >140 mmHg systolic*
- Raised diastolic >90 mmHg

- Significant proteinuria (++protein or more) with raised systolic / diastolic
- Borderline systolic / diastolic + symptoms of PET +/- proteinuria
- Significant proteinuria (++protein or more) and symptoms suggestive of PET (oedema / frontal headache / epigastric pain / visual disturbance)

* in detecting a raised systolic >140mmHg on the first occasion

If no other concerns arrange for the woman to be seen within 1 week for repeat BP measurement and urinalysis

- If there is +proteinuria send MSU
- If the repeat BP check is >140 mmHg again - then refer for obstetric opinion
- If the repeat BP check is <140 mmHg and no other concerns then return to routine follow up/ antenatal care See Appendix C for flowchart for this process

5 Management of chronic hypertension in pregnancy

5.1 Pre-pregnancy advice

5.1.1 Offer women/people with chronic hypertension referral to a specialist in hypertensive disorders of pregnancy to discuss the risks and benefits of treatment.

5.1.2 Advise women/people who take angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs), that there is an increased risk of congenital abnormalities if these drugs are taken during pregnancy and discuss alternative antihypertensive treatment

5.1.3 Advise women/people who take thiazide or thiazide-like diuretics: that there may be an increased risk of congenital abnormalities and neonatal complications if these drugs are taken during pregnancy and discuss alternative antihypertensive treatment

5.1.4 Stop antihypertensive treatment in women/people taking ACE inhibitors or ARBs if they become pregnant (preferably within 2 working days of notification of pregnancy) and offer alternatives as per section5.3.

5.2 Treatment of chronic hypertension

5.2.1 Offer pregnant women/people with chronic hypertension advice on:

- Weight management
- Exercise
- Healthy eating

- Lowering the amount of salt in their diet

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

- Sustained systolic blood pressure is <110 mmHg **or**
- Sustained diastolic blood pressure is < 70 mmHg **or**
- The woman has symptomatic hypotension

5.2.3 Offer antihypertensive treatment to pregnant women/people who have chronic hypertension and who are not already on treatment if they have:

- Sustained systolic blood pressure of 140 mmHg or higher
- Sustained diastolic blood pressure of 90 mmHg or higher
- Aim for a target blood pressure of 135/85 mmHg

5.3 **Antihypertensive Drugs**

5.3.1 Consider labetalol to treat chronic hypertension in pregnant women/people

5.3.2 Consider nifedipine for women/people in whom labetalol is not suitable

5.3.3 Consider Methyldopa if both labetalol and nifedipine are not suitable

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

5.4 **Antenatal appointments**

5.4.1 Weekly appointments if hypertension is poorly controlled

5.4.2 Appointments every 2 to 4 weeks if hypertension is within target blood pressure 135/85.

5.5 **Timing of birth**

5.5.1 Do not offer planned early birth before 37 weeks to women/people with chronic hypertension whose blood pressure is lower than 160/110 mmHg, with or without antihypertensive treatment, unless there are other medical indications or fetal growth restriction.

5.5.2 For women/people with chronic hypertension whose blood pressure is lower than 160/110 mmHg with or without antihypertensive treatment timing of birth should be agreed after 37 weeks between the woman and the senior obstetrician.

5.5.3 If planned early birth is necessary offer a course of antenatal corticosteroids and magnesium sulphate if indicated, in line with the guideline on preterm labour and birth.

5.6 **Postnatal investigation, monitoring and treatment**

5.6.1 Measure blood pressure:

- 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
- Aim to keep blood pressure lower than 140/90 mmHg
- Continue antihypertensive treatment, if required
- 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. Methyldopa can cause postnatal depression
- Offer a review of antihypertensive treatment 2 weeks after the birth, with their GP or specialist.
- Offer a medical review 6–8 weeks after the birth with their GP or specialist as appropriate.

6 Management of Gestational Hypertension

6.1.1 A full assessment should be carried out in a secondary care setting by a healthcare professional that is trained in the management of hypertensive disorders of pregnancy.

6.1.2 Reassessment of Asprin requirement require Section 2 : 2

6.1.3 In women/people with gestational hypertension, take account of the following risk factors that require additional assessment and follow-up:

- Nulliparity
- Age 40 years or older
- Pregnancy interval of more than 10 years
- Family history of pre-eclampsia
- Multi-fetal pregnancy
- BMI of 35 kg/m^2 or more
- Gestational age at presentation
- Previous history of pre-eclampsia or gestational hypertension
- Pre-existing vascular disease
- Pre-existing kidney disease

6.2 Management of pregnancy with gestational hypertension

	Degree of hypertension

	Hypertension: **blood pressure of 140/90–159/109 mmHg**	**Severe hypertension:** **blood pressure of 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/people
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

6.3 Antihypertensive Drugs

6.3.1 Consider labetalol to treat gestational hypertension

6.3.2 Consider nifedipine for whom labetalol is not suitable

6.3.3 Consider methyldopa if labetalol or nifedipine are not suitable

Base the choice on side-effect profiles, risk (including fetal effects) and the woman's preferences.

6.4 Timing of birth

6.4.1 Do not offer planned early birth before 37 weeks to women/people with gestational hypertension whose blood pressure is lower than 160/110 mmHg, unless there are other medical indications or fetal growth restriction

6.4.2 For women/people with gestational hypertension whose blood pressure is lower than 160/110 mmHg after 37 weeks, timing of birth should be agreed between the woman and the senior obstetrician

6.4.3 If planned early birth is necessary offer a course of antenatal corticosteroids and magnesium sulphate if indicated, in line with the guideline MP031 preterm labour and birth

6.5 Postnatal investigation, monitoring and treatment

6.5.1 Measure blood pressure:

- 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
- Neonatal Hypoglycaemia Pathway required if has been on antenatal Beta –blockers MP069 Care of Newborn immediately after Birth

6.5.2 Continue antihypertensive treatment if required

- Advise women/people 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.
- If a woman has taken methyldopa to treat gestational hypertension, stop within 2 days after the birth and change to an alternative treatment if necessary

- Please see antihypertensive treatment during the postnatal period, including during breastfeeding
- For women/people with gestational hypertension who did not take antihypertensive treatment and have given birth, start antihypertensive treatment if their blood pressure is 150/100 mmHg or higher

6.5.3 Write a care plan for postnatal community care that includes all of 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.

6.5.4 Offer women/people who have had gestational hypertension and who remain on antihypertensive treatment, a medical review with their GP or specialist 2 weeks after transfer to community care.

6.5.5 Offer all women/people who have had gestational hypertension a medical review with their GP or specialist 6–8 weeks after the birth.

7 Management of Pre-eclampsia

7.1 Assessing pre-eclampsia

7.1.1 Assessment of women/people with pre-eclampsia should be performed by a healthcare professional trained in the management of hypertensive disorders of pregnancy

7.1.2 Carry out a full clinical assessment at each antenatal appointment for women/people with pre-eclampsia

7.1.3 Offer admission to hospital for surveillance and any interventions needed if there are concerns for the wellbeing of the woman or baby

7.2 Features of severe preeclampsia

Concerns could include any of the following: (Features of severe disease)

7.2.1 Sustained systolic blood pressure of 160 mmHg or higher

7.2.2 Any maternal biochemical or haematological investigations that cause concern for example, a new and persistent:

7.2.2.1 Rise in creatinine (90 micromol/litre or more, 1 mg/100 ml or more) **or**

7.2.2.2 Rise in alanine transaminase (over 70 IU/litre, or twice upper limit of normal range) **or**

7.2.2.3 Fall in platelet count (under 150,000/microlitre)

7.3 HELLP syndrome

Signs of impending eclampsia (severe headache, visual disturbance, epigastric pain/vomiting, Papilloedema, clonus, liver tenderness)

- Signs of impending pulmonary oedema
- Other signs of severe pre-eclampsia
- Suspected fetal compromise
- Any other clinical signs that cause concern

7.4 Management and treatment of pregnancy with pre-eclampsia

	Degree of hypertension	
	Hypertension: **blood pressure of 140/90–159/109 mmHg**	**Severe hypertension:** **blood pressure of 160/110 mmHg or more**
Admission to hospital	Admit if any clinical concerns for the wellbeing of the woman or baby	Admit, but if BP falls below 160/110 mmHg then manage as for hypertension
Antihypertensive pharmacological treatment	Offer pharmacological treatment if BP remains above 140/90 mmHg	Offer pharmacological treatment to all women/people
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	At least every 48 hours, and more frequently if the woman is admitted to hospital	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	Only repeat if clinically	Only repeat if clinically indicated,

testing [a]	indicated, for example, if new symptoms and signs develop or if there is uncertainty over diagnosis	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	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

7.5 Offer labetalol to treat hypertension

7.6 Offer nifedipine for women/people in whom labetalol is not suitable

7.7 Offer methyldopa if labetalol or nifedipine are not suitable

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

8 Medical management of acute severe hypertension, severe pre-eclampsia or eclampsia in a critical care setting

8.1 Women/people with these condition should be managed in a high dependency unit environment (on the delivery suite if undelivered)

8.2 Consultant on call must involve in the management and attend in person during out of hours when registrar on call is requesting for help

8.3 Anticonvulsants in severe pre-eclampsia or eclampsia

8.3.1 If a woman in a critical care setting who has severe hypertension or severe pre-eclampsia or previously had an eclamptic fit, give intravenous magnesium sulphate.

8.3.2 Magnesium sulphate is never a substitute for prompt initiation of antihypertensive treatment of severe hypertension as it has minimal effects on blood pressure.

8.3.3 Consider prophylactic magnesium sulphate treatment, if one or more of the following features of severe pre-eclampsia is present:

- Continue signs of cerebral irritation - ongoing or recurring severe headaches, agitation and clonus or drowsiness, visual scotomata, nausea or vomiting
- Epigastric pain
- Severe hypertension
- Progressive deterioration in laboratory blood tests (such as rising creatinine or liver transaminases, or falling platelet count).

8.3.4 A loading dose of 4g should be given intravenously over 5 minutes, followed by an infusion of 1 g/hour maintained for 24 hours after delivery or after the last seizure.

8.4 Doses of magnesium sulphate

Loading Dose	Maintenance Dose
4g Magnesuim Sulphate (8mls of 50% solution) Mixed with 12ml sodium chloride for injections I.V. over 5 mins	10g Magnesuim Sulphate (20mls) Mixed with 30mls sodium chloride for injection to total volume 50ml Infusion to run at a rate of 5mls/hour (1g/hour)

8.5 Recurrent fits should be treated with a further dose of 2–4 g given intravenously over 5 to 15 minutes.

8.6 Side effects of parenteral magnesium sulphate include neuromuscular blockage or loss of tendon reflexes, double vision and slurred speech, respiratory depression and cardiac arrest.

8.7 Observations at least hourly or as per Obstectric Care plan.

8.7.1 Hourly of the following:
- Pulse Oximetry
- Urine output
- Respiratory rate
- Deep Tendon Reflexes

8.7.2 If the following have been achieved after the first four hours following commencement of Magnesuim Sulphate you can change the frequency to four hourly:
- Bicep reflexs present
- Respiratory rate >12
- Urine output >100ml previous 4 hrs; 97% magnesium is excreted in urine; presence of oliguria can lead to toxic levels

8.8 If the woman is oliguric, has liver function impairment or acute kidney injury or has further convulsion, serum magnesium sulphate levels should be monitored (therapeutic range 2 – 4 mmol/L).

8.9 Magnesuim Sulphate regime if in AKI:

Loading Dose	Maintenance Dose
4g Magnesuim Sulphate (8mls of 50% solution) Mixed with 12ml sodium chloride for injections I.V. over 5 mins	10g Magnesuim Sulphate (20mls) Mixed with 30mls sodium chloride for injection to total volume 50ml Infusion to run at a rate of 2.5mls/hour (1g/hour)

8.10 Do not use diazepam, phenytoin or other anticonvulsants as an alternative to magnesium sulphate in women/people with eclampsia.

9 Acute management of severe hypertension

(**Blood pressure of 160/110 mmHg or MAP 125 or more is obstetric emergency)**

MAP = Diastolic BP + 1/3 (Systolic BP – Diastolic BP)

9.1 Treat women/people with above BP or MAP during pregnancy or after birth immediately with one of the following:

Labetalol infusion: - First Line Treatment

Intravenous labetalol should be used for first-line therapy because it is effective, has a rapid onset of action, and a good safety profile. If the woman can tolerate oral therapy initial 200mg dose can be given immediately whilst gaining venous access for IV labetalol:

Step 1	Begin with 20mg intravenously over 2 minutes (given as 4mls labetalol: 5mg/ml)
Step 2	If BP remains above target level at 10 minutes, give 40mg IV over 2 minutes
Step 3	If BP remains above target level at 20 minutes, give 80mg IV over 2 minutes
Step 4	If BP remains above target level at 30 minutes, give 80mg IV over 2 minutes
Step 5	If BP remains above target level at 40 minutes, give 80mg IV over 2 minutes

9.2 The fall in blood pressure begins within 5 to 10 minutes and lasts from 3 to 6 hours. Continuous cardiac monitoring is not necessary routinely, but should be used in patients with relevant co-morbidities (eg, coronary artery disease).

9.3 Cumulative maximum dose is 300 mg. If target BP is not achieved, switch to another class of agent.

Alternatively

9.4 A continuous IV infusion of 0.5 to 2 mg/minute can be started after initial 20 mg IV dose instead of intermittent therapy.

9.5 Adjust dose within this range to achieve target blood pressure.

Step 1	Infusion of (neat) labetalol via syringe pump at 5mg/ml starting rate of 4ml/hr or 20mg/hr
Step 2	If BP remains above target level at 30 minutes increase to 40mg/hr
Step 3	If BP remains above target level at 30 minutes increase to 80mg/hr
Step 4	If BP remains above target level at 30 minutes increase to 160mg/hr (maximum dose)

9.6 Cumulative maximum dose is 300 mg. If target BP is not achieved, switch to another class of agent.

9.7 Note - Although manufacturer's labelling recommends against exceeding a 300 mg cumulative dose (intermittent IV and continuous infusion) it may be reasonable to exceed this threshold in closely monitored patients who are responding.

9.8 **Contraindications**

9.8.1 Labetalol is contra-indicated in patients with a history of oral steroid dependent asthma or obstructive airways disease. Oral nifedipine would be the drug of choice in these women/people. In mild asthma (i.e. defined as not requiring regular or steroid based oral medication), labetalol may be used with caution and attention paid to the development of bronchospasm.

9.9 **Oral nifedipine – Second Line Treatment**

Step 1	Immediate release nifedipine 10mg orally
Step 2	If target BP not achieved after 20 minutes administer 10-20mg depending on initial response
Step 3	If target BP not achieved after further 20 minutes administer 10-20mg depending on previous response
Step 4	If target BP not achieved after further 20 minutes switch to another agent

9.9.1 **Caution** - In most cases, use of immediate-release oral nifedipine will be safe and well tolerated; however, there is a risk of an acute, precipitous fall in blood pressure, which may result in a reduction in uteroplacental perfusion. The shorter acting preparations of nifedipine are also associated with a higher incidence of headache and tachycardia.

9.9.2 Nifidipine used in conjunction with Magnisium sulphate may cause profound hypotension.

9.10 **Intravenous hydralazine – Third Line Treatment**
Adequate reduction of blood pressure is less predictable than with IV labetalol

Step 1	5 mg IV gradually over 1 to 2 minutes
Step 2	If BP remains above target level at 20 minutes, give 5 or 10mg IV over 2 minutes, depending on the initial response
Step 3	If BP remains above target level at 40 minutes, give 5 or 10mg IV over 2 minutes,

	depending on the initial response
Step 4	If BP remains above target level at 60 minutes, give 10 mg IV over 2 minutes, depending on the previous response
	Cumulative maximum dose is 30 mg

9.11 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.

9.12 If target BP is not achieved, switch to another class of agent.

9.13 In women/people with severe hypertension who are in critical care, monitor their response to treatment:

9.13.1 To ensure that their blood pressure falls

9.13.2 To identify adverse effects for both the woman and the baby

9.13.3 To modify treatment according to response

10 Corticosteroids for fetal lung maturation

10.1 If early birth is considered likely within 7 days in women/people with pre-eclampsia, offer a course of antenatal corticosteroids in line with the NICE guideline on preterm labour and birth.

10.2 Corticosteroids to manage HELLP syndrome
Do not use dexamethasone or betamethasone for the treatment of HELLP syndrome.

11 Fluid balance and volume expansion

Do not use volume expansion in women/people with severe pre-eclampsia unless hydralazine is the antenatal antihypertensive

11.1 In women/people with severe pre-eclampsia, limit maintenance fluids to 80 ml/hour unless there are other ongoing fluid losses (for example, haemorrhage).

11.2 The woman should have an indwelling urinary catheter with an hourly urometer attached hourly fluid balance should be clearly documented on a fluid balance chart

12 CVP line

12.1 Should be considered if:

- oliguria persists despite management with fluid challenges
- serum albumin <20
- any suspicion of HELLP syndrome: Liaise with the anaesthetist

12.2 Referral to critical care:
Refer women/people with severe hypertension or severe pre-eclampsia to the appropriate critical care setting using the criteria in table 4.

12.3 Clinical criteria for choice of critical care level

Level 3 care	Severe pre-eclampsia and needing ventilation
Level 2 care	Step-down from level 3 or severe pre-eclampsia with any of the following complications: • eclampsia • HELLP syndrome • haemorrhage • hyperkalaemia • severe oliguria • coagulation support • intravenous antihypertensive treatment • initial stabilisation of severe hypertension • evidence of cardiac failure • abnormal neurology
Level 1 care	Pre-eclampsia with hypertension Ongoing conservative antenatal management of severe preterm hypertension Step-down treatment after the birth

13 Plan for Delivery

13.1 Involve a senior obstetrician in any decisions on timing of birth for women/people with pre-eclampsia.

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

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

13.4 Caesarean section versus induction of labour
Choose mode of birth for women/people with severe hypertension, severe pre-eclampsia or eclampsia according

- clinical circumstances
- gestational age
- fetal condition
- womans/persons preference

13.5 Decision regarding the timing of delivery as the only cure for pre – eclampsia is delivery

13.5.1 This should not be attempted before adequate control of BP, coagulopathy; eclamptic seizues and haemodynamic stability are achieved.

13.5.2 To avoid neonatal deaths or long term complications from prematurity it is customary to try and prolong the pregnancy with expectant management. This often not possible for more than a few weeks and in severe cases only hours or days may be gained.

13.5.3 On average, most women/people with pre eclampsia require delivery within 2 weeks from the time of diagnosis.

13.5.4 Threshold for considering planned early birth could include (but are not limited to) any of the following knowm features of servere pre-eclampsia:

13.5.4.1 Inability to control maternal blood pressure despite using 3 or more classes of antihypertensives in appropriate doses

13.5.4.2 Maternal pulse oximetry less than 90%

13.5.4.3 Progressive deterioration in liver function, renal function, haemolysis, or platelet count

13.5.4.4 Ongoing neurological features, such as severe intractable headache, repeated visual scotomata, or eclampsia

13.5.4.5 Placental abruption

13.5.4.6 Reversed end-diastolic flow in the umbilical artery doppler velocimetry, a non-reassuring cardiotocograph, or stillbirth

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

13.6 **Timing of birth in women/people with pre-eclampsia**

Weeks of pregnancy	**Timing of birth**
Pre-viable gestational age	If a woman develops preeclampsia with severe features as above before fetal viability, offer termination of pregnancy is an option

	to reduce the mother's risk of developing life-threatening morbidity (eg, cerebrovascular haemorrhage) or death to prevent the birth of an infant at the limit of viability and thus at high risk of death or severe permanent disability.
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 to 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.
37 weeks onwards	Initiate birth within 24–48 hours.

14 Postnatal investigation, monitoring and treatment (including after discharge from critical care)

Blood pressure control

14.1 In women/people with pre-eclampsia who did not take antihypertensive treatment and have given birth, measure blood pressure:

14.1.1 At least 4 times a day while the woman is an inpatient

14.1.2 At least once between day 3 and day 5 after birth

14.1.3 On alternate days until normal, if blood pressure was abnormal on days 3–5.

14.2 In women/people with pre-eclampsia who did not take antihypertensive treatment and have given birth, start antihypertensive treatment if blood pressure is 150/100 mmHg or higher.

14.3 In women/people who had pre-eclampsia ask:

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

14.3.2 In women/people with pre-eclampsia who took antihypertensive treatment and have given birth,

14.4 Measure blood pressure:

14.4.1 At least 4 times a day while the woman is an inpatient

14.4.2 Every 1–2 days for up to 2 weeks after transfer to community care until the woman is off treatment and has no hypertension.

14.4.3 Continue antihypertensive treatment (see **section 19** for choice of antihypertensive during the postnatal period)

14.4.4 Consider reducing antihypertensive treatment if their blood pressure falls below 140/90 mmHg

14.4.5 Reduce antihypertensive treatment if their blood pressure falls below 130/80 mmHg.

14.4.6 If a woman has taken methyldopa to treat pre-eclampsia, stop within 2 days after the birth and change to an alternative treatment if necessary (see section 19 for choice of antihypertensive during the postnatal period). As Methyldopa can be associated with postnatal depression.

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

14.4.7.1 There are no symptoms of pre-eclampsia

14.4.7.2 Blood pressure, with or without treatment, is 150/100 mmHg or less

14.4.7.3 Blood test results are stable or improving.

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

14.5.1 Who will provide follow-up care, including medical review if needed

14.5.2 Frequency of blood pressure monitoring

14.5.3 Thresholds for reducing or stopping treatment

14.5.4 Indications for referral to primary care for blood pressure review

14.5.5 Self-monitoring for symptoms

14.6 Offer women/people who have had pre-eclampsia and who remain on antihypertensive treatment, a medical review with their GP or specialist 2 weeks after transfer to community care.

14.7 Offer all women/people who have had pre-eclampsia a medical review with their GP or specialist 6–8 weeks after the birth.

15 Haematological and biochemical monitoring

15.1 In women/people who have pre-eclampsia with mild or moderate hypertension, or after step-down from critical care:

15.1.1 Measure platelet count, transaminases and serum creatinine 48–72 hours after birth or step-down

15.1.2 Do not repeat platelet count, transaminases or serum creatinine measurements if results are normal at 48–72 hours.

15.2 If biochemical and haematological indices are outside the reference range in women/people with pre-eclampsia who have given birth, repeat platelet count, transaminases and serum creatinine measurements as clinically indicated until results return to normal.

15.3 In women/people with pre-eclampsia who have given birth, carry out a urinary reagent-strip test 6–8 weeks after the birth.

15.4 Offer women/people who had pre-eclampsia and still have proteinuria (1+ or more) at 6–8 weeks after the birth, a further review with their GP or specialist at 3 months after the birth to assess kidney function.

15.5 Consider referring women/people with an abnormal kidney function assessment at 3 months for a specialist kidney assessment in line with the NICE guideline on chronic kidney disease in adults.

Section 3: Fetal monitoring

15.6 **Fetal monitoring in chronic hypertension**

15.6.1 In women/people with chronic hypertension, carry out an ultrasound for fetal growth and amniotic fluid volume assessment, and umbilical artery doppler velocimetry at 30 and 34 weeks.

15.6.2 In women/people with chronic hypertension, only carry out cardiotocography if clinically indicated.

15.7 **Fetal monitoring in gestational hypertension**

15.7.1 In women/people with gestational hypertension, carry out an ultrasound for fetal growth and amniotic fluid volume assessment and umbilical artery doppler velocimetry at diagnosis and if normal repeat every 2 to 4 weeks, if clinically indicated.

15.7.2 In women/people with gestational hypertension, only carry out cardiotocography if clinically indicated.

15.8 **Fetal monitoring in pre-eclampsia or severe gestational hypertension**

15.8.1 Carry out cardiotocography at diagnosis of pre-eclampsia or severe gestational hypertension.

15.8.2 If conservative management of pre-eclampsia or severe gestational hypertension is planned, carry out all the following tests at diagnosis:

15.8.2.1 Ultrasound for fetal growth and amniotic fluid volume assessment

15.8.2.2 Umbilical artery doppler velocimetry

15.8.3 If the results of all fetal monitoring are normal in women/people with pre-eclampsia or severe gestational hypertension, do not routinely repeat cardiotocography unless clinically indicated.

15.8.4 In women/people with pre-eclampsia or severe gestational hypertension, repeat cardiotocography if any of the following occur:

15.8.4.1 The woman reports a change in fetal movement

15.8.4.2 Vaginal bleeding

15.8.4.3 Abdominal pain

15.8.4.4 Deterioration in maternal condition

15.8.5 n women/people with pre-eclampsia or severe gestational hypertension, repeat ultrasound for fetal growth and amniotic fluid volume assessment or umbilical artery doppler velocimetry every 2 weeks, with subsequent surveillance and monitoring determined by the findings of these scans.

15.8.6 For women/people with pre-eclampsia or severe gestational hypertension, write a care plan that includes all of the following:

15.8.6.1 The timing and nature of future fetal monitoring

15.8.6.2 Fetal indications for birth and if and when antenatal corticosteroids should be given

15.8.6.3 Plans for discussion with neonatal paediatricians and obstetric anaesthetists

16 Women/people who need additional fetal monitoring

16.1 Carry out an ultrasound for fetal growth and amniotic fluid volume assessment and umbilical artery doppler velocimetry starting at between 28 and 30 weeks (or at least 2 weeks before previous gestational age of onset if earlier than 28 weeks) and repeating 4 weeks later in women/people with previous:

16.1.1 Severe pre-eclampsia

16.1.2 Pre-eclampsia that resulted in birth before 34 weeks

16.1.3 Pre-eclampsia with a baby whose birth weight was less than the 10th centile

16.1.4 Intrauterine death

16.1.5 Placental abruption

16.2 In women/people who need additional fetal monitoring as above, carry out cardiotocography only if clinically indicated.

17 Intrapartum care

17.1 Give advice and treatment to women/people in line with the NICE guideline on intrapartum care, unless there are recommendations in this guideline on the same topic. Offer care in accordance with the NICE guideline on intrapartum care for women/people with hypertension whether treated or untreated, and not just on the basis of blood pressure in labour.

17.2 Give women/people with chronic hypertension advice and care in line with the NICE guideline on intrapartum care for women/people with existing medical conditions or obstetric complications and their babies.

17.3 **Blood pressure monitoring:**

17.3.1 Hourly

17.3.2 Every 15–30 minutes if blood pressure greater 160/110 mmHg

17.3.3 Continue use of antenatal antihypertensive

17.4 **Control of fluid balance**

17.4.1 The woman should have an indwelling urinary catheter with an hourly urometer attached

17.4.2 Total fluid input should be restricted to 80mls/hour (or 1ml/kg/hour)

17.4.3 Hourly fluid balance should be clearly documented on a fluid balance chart

17.4.4 if oliguric (< 20mls/hour) for more than 6 hours, give a fluid challenge with 250mls colloid over 20 mins and check U&Es

17.4.5 If oliguria persists for further 30 mins after fluid challenge, commence maintenance Hartmann's infusion of 1ml/kg/hour, monitoring carefully for signs of pulmonary oedema (tachypnoea, basal crackles or falling O_2 sats)

17.5 **Haematological and biochemical monitoring**

17.5.1 Determine the need for haematological and biochemical tests using the same criteria as in the antenatal period even if regional analgesia is being considered

17.6 **Care during epidural analgesia**

17.6.1 Do not preload women/people who have severe pre-eclampsia with intravenous fluids before establishing low-dose epidural analgesia or combined spinal epidural analgesia.

17.7 **Management of second stage of labour**

17.7.1 Do not routinely limit the duration of the second stage of labour in women/people with controlled hypertension.

17.7.2 Consider operative or assisted birth in the second stage of labour for women/people with severe hypertension whose hypertension has not responded to initial treatment.

18 Antihypertensive treatment during the postnatal period, including during breastfeeding bsuh.medicines.information@nhs.net

18.1.1 Explain to women/people who wish to breastfeed that:

18.1.1.1 Antihypertensive medicines can pass into breast milk

18.1.1.2 Most antihypertensive medicines taken while breastfeeding only lead to very low levels in breast milk, so the amounts taken in by babies are very small and would be unlikely to have any clinical effect

18.1.1.3 Most medicines are not tested in pregnant or breastfeeding women/people, so disclaimers in the manufacturer's information are not because of any specific safety concerns or evidence of harm.

18.1.1.4 Make decisions on treatment together with the woman, based on her preferences.

18.1.1.5 When discharged home, advise women/people to monitor their babies for drowsiness, lethargy, pallor, cold peripheries or poor feeding.

18.1.1.6 Where possible, avoid using diuretics or angiotensin receptor blockers for those who are breastfeeding or expressing milk.

18.1.1.7 Treat women/people who are not breastfeeding and who are not planning to breastfeed in line with the NICE guideline on hypertension in adults.

18.1.1.8 PIL available at https://www.nice.org.uk/guidance/ng133/resources/antihypertensive-treatment-during-the-postnatal-period-pdf-313945610004

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

18.1.3 For women/people of black African or Caribbean family origin with hypertension during the postnatal period, consider antihypertensive treatment with:

18.1.3.1 Nifedipine

18.1.3.2 Amlodipine if the woman has previously used this to successfully control her blood pressure.

18.2 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:

18.2.1 Adding atenolol or labetalol to the combination treatment **or**

18.2.2 Swapping 1 of the medicines already being used for atenolol or labetalol

19 Advice and follow-up at transfer to community care

19.1 Likelihood of recurrence of hypertensive disorders of pregnancy

	Type of hypertension in previous or current pregnancy		
Prevalence of hypertensive disorder in a future pregnancy	**Any hypertension in pregnancy**	**Pre-eclampsia**	**Gestational hypertension**
Any hypertension	Approximately 21% (1 in 5 women/people)	Approximately 20% (1 in 5 women/people)	Approximately 22% (1 in 5 women/people)
Pre-eclampsia	Approximately 14% (1 in 7 women/people)	Up to approximately 16% (1 in 6 women/people) If birth was at 28–34 weeks[a]: approximately 33% (1 in 3 women/people) If birth was at 34–37 weeks: approximately 23% (1 in 4 women/people)	Approximately 7% (1 in 14 women/people)
Gestational hypertension	Approximately 9% (1 in 11 women/people)	Between approximately 6 and 12% (up to 1 in 8 women/people)	Between approximately 11 and 15% (up to 1 in 7 women/people)
Chronic hypertension	Not applicable	Approximately 2% (up to 1 in 50 women/people)	Approximately 3% (up to 1 in 34 women/people)

[a] No evidence was identified for women/people who gave birth at less than 28 weeks, but the committee agreed that the risk was likely to be at least as high, if not higher, than that for women/people who gave birth between 28 and 34 weeks.

19.2 Long-term risk of cardiovascular disease

	Type of hypertension in current or previous pregnancy			
Risk of future cardiovascular disease [a, b]	**Any hypertension in pregnancy**	**Pre-eclampsia**	**Gestational hypertension**	**Chronic hypertension**
Major adverse cardiovascular event	Risk increased (up to approximately 2 times)	Risk increased (approximately 1.5–3 times)	Risk increased (approximately 1.5–3 times)	Risk increased (approximately 1.7 times)
Cardiovascular mortality	Risk increased (up to approximately 2 times)	Risk increased (approximately 2 times)	(no data)	(no data)
Stroke	Risk increased (up to approximately 1.5 times)	Risk increased (approximately 2–3 times)	Risk may be increased	Risk increased (approximately 1.8 times)
Hypertension	Risk increased (approximately 2–4 times)	Risk increased (approximately 2–5 times)	Risk increased (approximately 2–4 times)	(not applicable)

[a] Risks described are overall estimates, summarised from risk ratios, odds ratios and hazard ratios.

[b] Increased risk is compared to the background risk in women/people who did not have hypertensive disorders during pregnancy. Absolute risks are not reported, because these will vary considerably, depending on the follow-up time (range from 1 to 40 years postpartum).

19.3 Advise women/people to discuss how to reduce their risk of cardiovascular disease, including hypertensive disorders, with their GP or specialist. This may include:

19.3.1 Avoiding smoking, as recommended in the NICE guideline on stop smoking interventions and services

19.3.2 Maintaining a healthy lifestyle, as recommended in the NICE guideline on cardiovascular disease

19.3.3 Maintaining a healthy weight, as recommended in the NICE guideline on obesity.

19.4 In women/people early birth before 34 weeks, consider pre-pregnancy counselling to discuss possible risks of recurrent hypertensive disorders of pregnancy, and how to lower them for any future pregnancies.

19.5 Body mass index and recurrence of hypertensive disorders of pregnancy

19.5.1 Advise women/people to achieve and keep a BMI within the healthy range before their next pregnancy (18.5–24.9 kg/m^2). See also the NICE guideline on *obesity: identification, assessment and management*.

19.6 Inter-pregnancy interval and recurrence of hypertensive disorders of pregnancy

19.6.1 Advise women/people that the likelihood of recurrence increases with an inter-pregnancy interval greater than 10 years.

19.7 Long-term risk of end-stage kidney disease

19.7.1 Women/people who have no proteinuria and no hypertension at the postnatal review (6–8 weeks after the birth) that although the relative risk of end-stage kidney disease is increased, the absolute risk is low and no further follow-up is necessary.

19.8 Thrombophilia and the risk of pre-eclampsia

19.8.1 Do not routinely perform screening for thrombophilia

20 Reference

Patient Information Leaflet: https://action-on-pre-eclampsia.org.uk/wp-content/uploads/2019/11/High-blood-pressure-in-pregnancy-blood-pressure-PDA-WEB.pdf

NICE guideline [NG133] Hypertension in pregnancy: diagnosis and management
Published date: 25 June 2019

Handbook of Obstetric Medicine, Fifth Edition (2015), Catherine Nelson- Piercy

Up to Date, Hypertension in Pregnancy (updated in April , 2020)

21 Appendix

Appendix A - How should the blood pressure (BP) be taken?

21.1 Woman should be reclined at 45 degrees, with BP cuff at level of heart

21.2 The appropriate size cuff should be used for her arm dimensions

21.3 The diastolic pressure should be measured using Korotkoff phase 5 (disappearance of sound, rather than muffling)

21.4 Automated methods need to be used with caution as they underestimate BP – ideally use manual sphygmomanometer if possible, or check BP with another validated device

Appendix B - CVP lines

Important points about CVP lines:

21.5 The point of reference for a reading of zero is the sternal notch when the patient is lying flat

21.6 If the fluid column does not move with respiration, it may be blocked

21.7 CVP should be checked every 15 mins during any fluid challenges or if there are concerns about pulmonary oedema or HELLP, otherwise the CVP can be checked hourly

CVP	Action
< 0cmH_2O	give fluid boluses of colloid, with maintenance fluid, until CVP rises or diuresis occurs
0-5cmH_2O	Normal reading Give maintenance fluids until diuresis occurs or CVP> 5
> 5cmH_2O	There is a risk of pulmonary oedema • Restrict fluids (fluid output + 30mls/hour) • check U&Es 4-hourly • give furosemide • Liaise with the hospital ITU outreach team

21.8 If pulmonary oedema does occur:

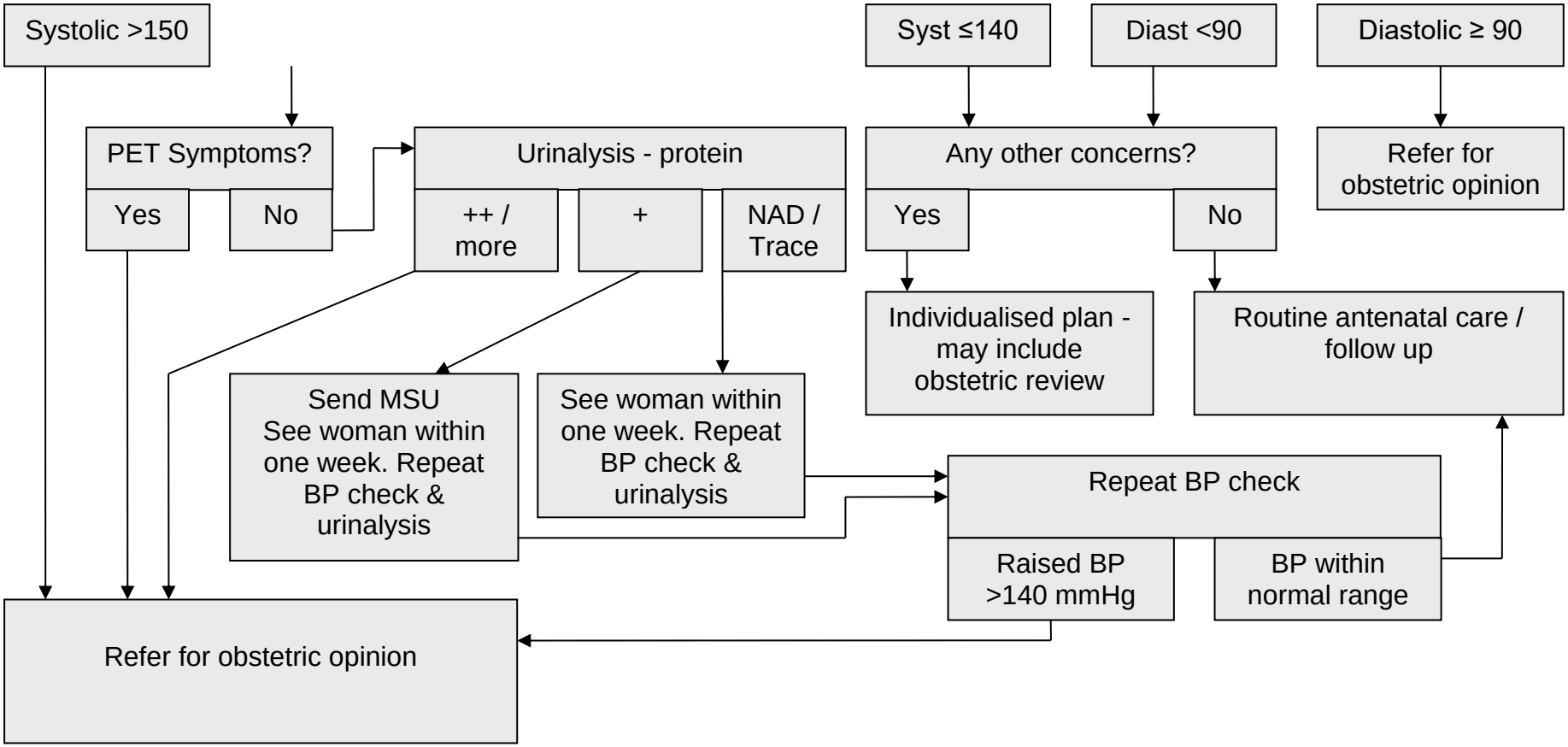
21.8.1 Sit the woman up

21.8.2 Give O_2 5L/min via non-rebreathe mask

21.8.3 Administer furosemide 20mg half-hourly up to total of 80mg

21.8.4 Consider communicating with ITU if does not resolve within the hour

22 Appendix C: Flowchart demonstrating guidance / management advice for midwives in community antenatal clinic settings



Appendix D: VIP Scoring

Visual Infusion Phlebitis (VIP)

Findings	Score	Action
IV site appears healthy	0	No signs of phlebitis **OBSERVE CANNULA**
One of the following is present; Slight pain near IV site or slight redness near IV site	1	Possible first signs of phlebitis **RESITE CANNULA**
Two of the following are present; Pain at IV site, erythema, swelling	2	Early stages of phlebitis **RESITE CANNULA**
All of the following are present; Pain along path of cannula, erythema, induration.	3	Medium stage of phlebitis **RESITE CANNULA** **CONSIDER TREATMENT** (this may be heat to cause vasodilation)
All of the following are present and extensive; Pain along path of cannula, erythema, induration, palpable venous cord.	4	Advanced stage of phlebitis or start of thrombophlebitis **RESITE CANNULA** **TREAT WITH IV ANTIBIOTICS**
All of the following are present; Pain along path of cannula, erythema, induration, palpable venous cord, pyrexia.	5	Advanced stage of thrombophlebitis. **RESITE CANNULA** **TREAT WITH IV ANTIBIOTICS** **CONSIDER ANTI-COAGULANT THERAPY**

(adapted from Jackson 1998)