Women & Children's Health Maternity Guideline

NHS North Bristol NHS Trust

Hypertension in Pregnancy
Includes Management of Severe Pre-Eclampsia and Eclampsia

Authors	Version	Reason for review	Ratified
Three SWON (South Western Obstetric Network) guidelines (PET, Fluid Management, and Severe Hypertension) combined, reviewed and amended by: Cathy Winter Practice Development Midwife, Tim Draycott, Consultant Obstetrician, Fiona Donald, Consultant Anaesthetist	Version 1 Written June 2007	New guideline from Three SWON (South Western Obstetric Network) guidelines (PET, Fluid Management, and Severe Hypertension) combined, reviewed and amended	Ratified by Intrapartum Clinical Team, June 2007
Gemma Crass, SHO, Sonia Barnfield, SpR, Stephanie Withers, Delivery Suite Matron.	Version 2 October 2009	Review date & in line with new CNST standards	Ratified by Intrapartum Clinical Team, Nov 2009 Release date: Dec 7th 2009 Review Date: July 2012
Amanda Yelland – Audit and Guideline coordinator	Version 3 September 2010	Review in line with new CNST standards	Ratified by Intrapartum Clinical Team Chair: September 2010
Author: Tracy Appleyard, Consultant Obstetrician Owner: Tracy Appleyard, Consultant Obstetrician	Version 4 March 2012	Reviewed in line with new National Guidance.	Ratified by ANCT May 2012 Also reviewed by IPCT
Joanna Crofts, Consultant Obstetrician	Version 5		Ratified. MCT November 2015 Review date. Nov 2018
Sharyn McKenna, Pt safety lead	Version 5.1	Sentence re phaeochromocytosis added (MBRRACE action)	
Released: 13th May 2016			Review date: November 2018
29/01/19	Version 5.2	Blood tracking appendix added	Review date: Jan 2019
	Version 5.3	Increase Aspirin to 150 mg	16 May 2019 launch July 2019
	Version 5.4	Additional information re Aspirin commencement and ceasing- November 2019	Review Jan 2019

Owner(s) (Names and designations)	Author(s) (Names and designations)	Version, Date written	Reason for Review	Ratified by and Date	Expiry Date
Naomi Jobson, Consultant Obstetrician Sophie Campbell, Midwife Karolina McDowell, Registrar	Naomi Jobson, Consultant Obstetrician Sophie Campbell, Midwife Karolina McDowell, Registrar	Version 6 April 2020	Reviewed in line with new NICE guidance to add in PIGF practices	Outside GL meeting. S Barnfield 1/5/2020	2022

Contents

Best Practice Points or Care Pathway

- *Reducing the risk of hypertensive disorders in pregnancy*

Advise women at high risk of pre-eclampsia to take 150mg of aspirin daily from 12 weeks until 36 weeks gestation.

- *Antihypertensive treatment:*

1st line oral Labetalol 200 mg (contraindicated in asthma or pulmonary oedema)
2nd line Nifedipine (Adalat Retard 20 mg) or Methyldopa 250 mg (not to be used postnatally)
3rd line – IV Labetalol or Hydralazine (see guideline for dosage)

- *Management of pregnancy with chronic hypertension*

Angiotension-converting enzyme inhibitors or angiotensin II receptor blockers to be changed once pregnancy confirmed to safe alternatives (see above)
Aim to keep BP <135/85 mmHg

Offer consultant ANC referral, with 2-4 weekly BP monitoring and growth USS

- *Management of pregnancy with gestational hypertension*

Offer women with gestational hypertension an integrated package of care covering admission to hospital, treatment, measurement of BP, testing for proteinuria and blood tests.
Aim to keep BP <135/85 mmHg

- *Management of pregnancy with pre-eclampsia*

Offer women with pre-eclampsia an integrated package of care covering admission to hospital, treatment, measurement of BP and blood tests. Consultant obstetric staff should document in the woman's notes the maternal (biochemical, haematological and clinical) and fetal thresholds for elective birth before 34 weeks in women with pre-eclampsia
Aim to keep BP <135/85 mmHg

- *Management of third stage of labour*

Any woman on antihypertensive treatment or a single BP in labour of ≥160/110 mmHg should be given Syntocinon 10 iu IM following vaginal birth or Carbetocin 100mcg IV following Caesarean section. Both Ergometrine and Syntometrine should be avoided.

Any woman in labour with two or more episodes of BP >140-159/ 90-109 mmHg (at least 30 minutes apart) should be given Syntocinon 10 iu IM following vaginal birth or Carbetocin 100mcg IV following Caesarean section. Both Ergometrine and Syntometrine should be avoided.

- *Postnatal follow up*

Arrange additional BP monitoring in the immediate postnatal period at time of transfer to community care. Offer all women with history of hypertension or pre-eclampsia a medical review at the postnatal review (6-8 weeks after the birth) with their GP.

Back to Top

Abbreviations

ABG	-Arterial blood gas
ACE	-Angiotension Converting Enzyme
ANC	-Antenatal clinic
ARBs	-Angiotensin II receptor blockers
BP	-Blood pressure
CTG	-Cardiotocogram
CXR	-Chest Xray
DAU	-Day Assessment Unit
DBP	-Diastolic Blood Pressure
ECG	-Electrocardiogram
ECHO	-Echocardiograph
FBC	-Full blood count
FMs	-Fetal movements
GECS	-Graduated elasticated compression stockings
GP	-General Practitioner
HELLP	-Haemolysis, elevated liver function tests and low platelets
hrs	-Hours
im	-Intramuscular
IOL	-Induction of labour
iu	-International units
iv	-Intravenous
LFT	-Liver function tests
LSCS	-Lower segment caesarean section
LV	-Liquor Volume
NSAIDs	-Non-steroidal anti-inflammatory drugs (eg Ibuprofen/diclofenac)
O_2	-Oxygen
PET	-Pre-eclampsia
Plts	-Platelets
PN	-Postnatal
Sats	-Saturations
SBP	-Systolic Blood Pressure
U&E	-Urea and electrolytes
uPCR	-Urinary protein:creatinine ratio
USS	-Ultrasound scan
Wks	-WeeksBack to top

Degrees of hypertension

- **Mild-moderate** BP 140-159/90-109 mmHg
- **Severe** BP ≥ 160/110 mmHg

Essential / Chronic Hypertension

- Hypertension present at booking or <20 wks or that is being treated at time of referral to maternity services
- Can be primary or secondary in aetiology
- Continues during pregnancy

Gestational / Pregnancy Induced Hypertension

- New diagnosis of hypertension in pregnancy
- >20 wks gestation
- Without significant proteinuria

Significant proteinuria

- UPCR >30 mg/mmol

Pre-eclampsia (PET)

- New diagnosis of hypertension in pregnancy
- > 20 wks gestation
- With significant proteinuria

Severe PET

- PET with severe hypertension
- And/or with symptoms
- And/or biochemical impairment
- And/or haematological impairment

Eclampsia

- Convulsive episode associated with PET

Back to top

1. Measurement of BP

- Readings should be taken with the women resting, in a 45º angle with appropriate size cuff (where upper arm circumference is >35cms use large cuff) at the level of the heart.
- Use Korotkoff V as the appropriate measurement of DBP. Obtain an estimated SBP by palpation, to avoid auscultatory gap.
- Automated BP recording devices can underestimate BP.
- If automated BP recording devices are used then they should be checked against a standard sphygmomanometer every 2 hrs.
- Each time BP is measured ask about severe headache and epigastric pain.

NB. Consider phaeochromocytoma in women with atypical, severe hypertension in pregnancy. If a woman with one autoimmune disease becomes unwell in pregnancy, consider another autoimmune condition.

2. Management of proteinuria

- Each time BP is measured check for proteinuria.
- **If there is proteinuria antenatally a diagnosis of PET should be considered**
- If there is proteinuria prenatally perform baseline renal function test and consider renal USS +/- referral to renal physicians for further investigations.
- Use urinalysis dipstick to screen for proteinuria.
- Do not routinely use 24hr urine collection to quantify proteinuria.
- Do not use first morning void to quantify proteinuria.
- When using urine protein creatinine ratio (uPCR), use 30mg/mmol as threshold for significant proteinuria.
- If the result is negative in the presence of high clinical suspicion of pre-eclampsia, consider repeating the sample.

Back to top

Reducing the risk of hypertensive disorders in pregnancy

1. **Symptoms of PET**

Tell women to seek advice from a healthcare professional immediately if they experience any of the following:

- severe headache
- problems with vision, such as blurring or flashing before the eyes
- severe pain just below the ribs
- vomiting
- sudden swelling of the face, hands or feet.

2. **Lifestyle and diet**

Advice on rest, exercise and work for women at risk of hypertensive disorders during pregnancy should be the same as for healthy pregnant women.
Do not recommend salt restriction during pregnancy solely to prevent gestational hypertension or PET.

3. **Antiplatelet agents**

Aspirin prophylaxis reduces the occurrence of PET, preterm birth and fetal and neonatal mortality in women at moderate or high risk of developing PET.

Advise women at **high risk** of pre-eclampsia or with **≥1 high risk factor or ≥2 moderate risk factors** for pre-eclampsia to take 150mg of aspirin daily in the evening, from 12 weeks until 36 weeks gestation.

(Appendix 1)

Aspirin is not licensed and it needs to be documented that the woman is aware of this (good practice).

4. **Other pharmaceutical agents**

Do not use the following to prevent hypertensive disorders during pregnancy:

- nitric oxide donors
- progesterone
- diuretics
- low molecular weight heparin

5. **Nutritional supplements**

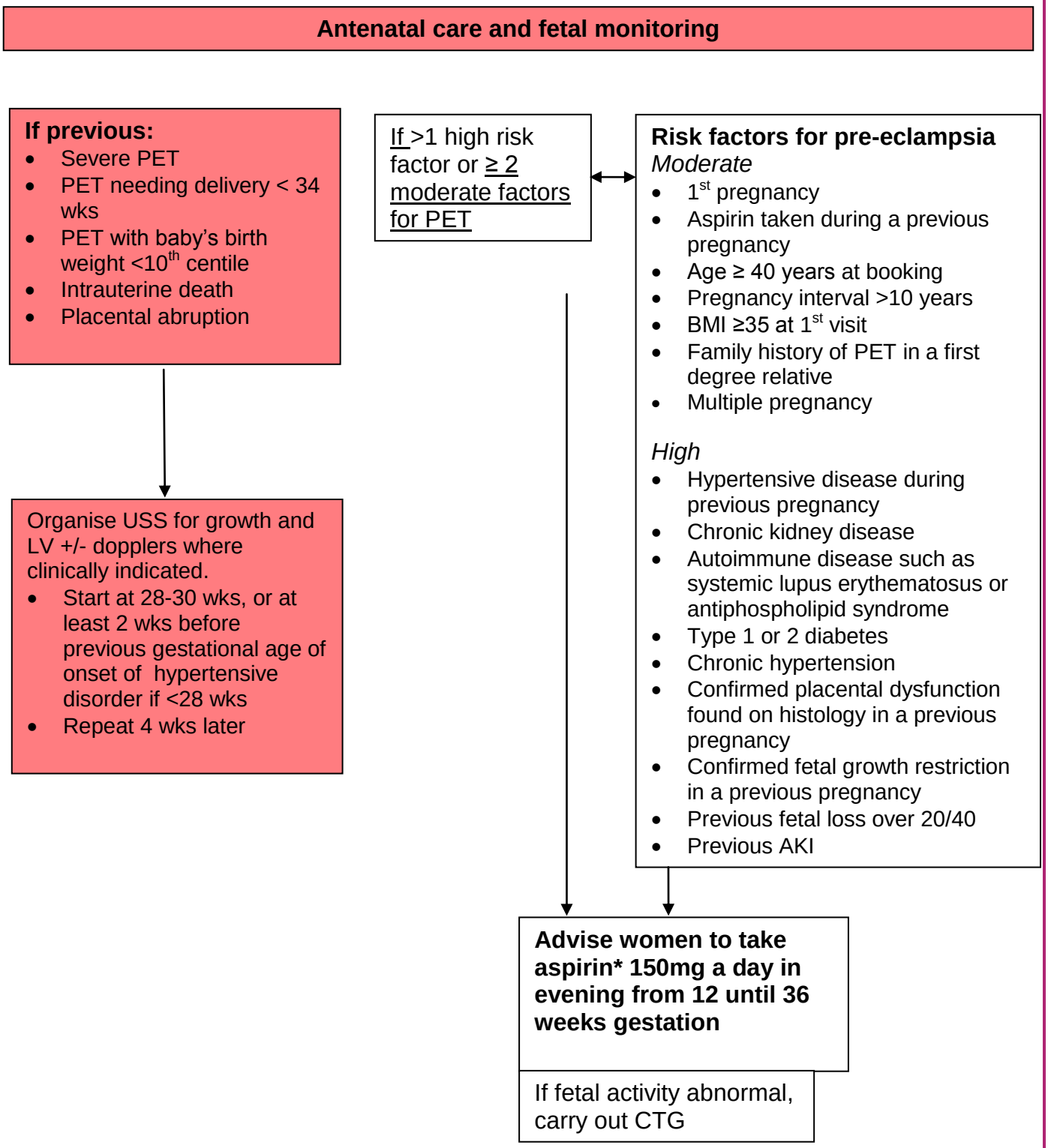
Do not recommend the following supplements solely with the aim of preventing hypertensive disorders during pregnancy:

- magnesium , folic acid, antioxidants (vitamins C and E) , fish oils or algal oils, garlic

Back to top

Appendix 1

Moderate and high risk of pre-eclampsia



Back to top

Appendix 2

Chronic hypertension

Pre-pregnancy advice

Antihypertensive treatment

Tell women who are taking ACE inhibitors, ARBS or chlorothiazide:

- There is an increased risk of congenital abnormalities if ACE inhibitors or ARBs are taken during pregnancy
- There may be an increased risk of congenital abnormalities with other antihypertensive treatments
- Limited evidence shows no increased risk of congenital abnormalities with other antihypertensive treatments
- To discuss other antihypertensive treatments with healthcare professional responsible for managing their hypertension, if they are planning pregnancy

Dietary sodium

- Encourage the woman to lower/substitute dietary sodium intake

General health

- Aim for BMI 20-25
- To take Folic Acid 400mcg once daily

Antenatal care

Consultations

- Maternal Medicine booking if on treatment or has evidence of target organ damage and/or secondary chronic hypertension
- Consultant booking for all other women

Timing of birth

If BP <160/110 mmHg with or without antihypertensive treatment:

- Do not offer birth ≤ 37 wks
- > 37 wks, timing of and maternal and fetal indications for birth should be agreed between woman and consultant
- If refractory severe chronic hypertension, offer birth after course of corticosteroids (if required) has been completed

Antihypertensive treatment

- Stop ACE inhibitors and ARBs within 2 days of notification of pregnancy and offer alternatives
- Offer antihypertensive treatment based on pre-existing treatment, side effect profile and teratogenicity
- Start treatment if BP >140/90, even if unmedicated before
- Aim for BP<135/85 mmHg
- Do not continue treatment if sustained BP <110/70 mmHg or woman is symptomatic of hypotension
- If secondary chronic hypertension refer to Maternal Medicine Team
- If on antihypertensive treatment at booking refer to Maternal Medicine Team
- BP monitoring to be decided by Consultant antenatal team (2-4 weekly if well controlled)
- If clinical suspicion of supraimposed PET after 20/40 (raising BP or new proteinuria) - offer PlGF based testing (see Appendix 12)

Fetal monitoring

Offer growth USS in line with the NBT SGA pathway

- USS at 28, 34 and 38 weeks gestation

If fetal activity abnormal refer to DAU and carry out

- CTG

Back to top

Intrapartum care

Mild or moderate hypertension (BP ≤ 159/109 mmHg)

- Continue antenatal antihypertensive treatment
- Measure BP hourly
- Carry out blood tests according to criteria from antenatal period
- If BP stable do not routinely limit duration of 2nd stage
- Ergometrine / Syntometrine should be avoided in any woman on antihypertensive treatment
- Ergometrine / Syntometrine should be avoided following two episodes of systolic BP between 140 and 159mmHg (at least 30 minutes apart) or two episodes of diastolic BP between 90 and 99mmHg (at least 30 minutes apart).
    - Syntocinon 10 iu IM following vaginal birth or Carbetocin 100mcg IV following Caesarean section should be administered

Severe hypertension (BP ≥ 160/110 mmHg)

- Measure BP every 15-30 mins until <159/109 mmHg
- Ergometrine / Syntometrine should be avoided any BP ≥160 systolic or ≥110mmHg diastolic
    - Syntocinon 10 iu IM following vaginal birth or Carbetocin 100mcg IV following Caesarean section

If regional anaesthesia is required/considered:

- See Appendix 8

Postnatal care

Antihypertensive treatment

- Aim to keep BP <140/90 mmHg
- Measure BP:
  -daily for first 2 days after birth
  -at least once 3-5 days after birth
  -as clinically indicated if antihypertensive treatment changed
- If Methyldopa was used during pregnancy, stop within 2 days of birth and restart pre-pregnancy antihypertensive treatment
- Continue antenatal hypertensive treatment
- Give patient information leaflet on "Hypertension in Pregnancy – Postnatal Information"

If woman breastfeeding

- Avoid diuretic treatment for hypertension
- Assess clinical wellbeing of baby, especially adequacy of feeding, at least daily for first 2 days after birth
- Offer woman information about safety of drugs for babies receiving breast milk (Appendix 7)

Follow-up care

- At transfer to community care, complete PN hypertension discharge letter detailing medication, frequency of BP monitoring, thresholds for reducing or stopping treatment
- GP to review long-term treatment 2 wks after birth
- GP to review again at 6-8 wks after birth

Appendix 3

Gestational hypertension

Antenatal care

Fetal monitoring

- A healthcare professional trained in the management of hypertensive disorders should carry out the assessment
- Take into account previous history of PET or gestational hypertension, pre-existing vascular or kidney disease, moderate risk factors for PET and gestational age at presentation
- Initial assessment is generally in the community and healthcare professionals can refer to DAU if they are concerned about a woman and if they identify moderate and severe hypertension

Mild - moderate hypertension
(BP 140/90-159/109 mmHg)

- Do not routinely admit to hospital
- Do not offer bed rest in hospital as treatment
- Send PET bloods (FBC, U&E, LFTs) at time of diagnosis
- Offer treatment if BP remains >140/90*
- Monitor BP 1-2 times a week until BP remains <135/85
- Test for proteinuria with each BP measurement**
- Consider monitoring PET bloods weekly
- Offer PGIF testing if <35/40 (see Appendix 12)

Severe hypertension
(BP≥ 160/110 mmHg)

- Admit to hospital until BP ≤159/109 mmHg
- See Appendix 5 for acute management
- Treat with 1st line oral labetalol* to keep BP <135/85 mmHg
- Measure BP at least 4 times a day
- Test for proteinuria daily**
- Send PET bloods (FBC, U&E, LFT) on admission and than weekly
- Offer PGIF testing if <35/40 (see Appendix 12)
- Assess VTE risk

Timing of birth

- Do not offer birth ≤37 wks
- >37 wks, timing of and maternal and fetal indications for birth should be agreed between woman and consultant
- If refractory severe gestational hypertension, offer birth after course of corticosteroids (if required) is completed

In women receiving outpatient care after severe hypertension has been effectively controlled in hospital

- Refer to Consultant ANC
- Measure BP and test for proteinuria 2 times a week
- Perform blood tests weekly

*Offer treatment other than labetalol only after considering side-effect profiles for the woman, fetus and newborn baby. Alternatives include methyldopa and nifedipine
**If significant proteinuria then see 'Management of preeclampsia' (Appendix 4)

Mild and moderate hypertension
(BP 140/90-159/109 mmHg)

Severe hypertension
(BP ≥160/110 mmHg)

If diagnosis confirmed by 34 wks

- USS fetal growth & LV
- +/- Umbilical artery dopplers as clinically indicated.
- Consider repeat USS 4 weekly if clinically indicated

If fetal activity abnormal carry out:

- CTG

If results of any fetal monitoring abnormal, discuss with consultant

At diagnosis

- USS fetal growth & LV +/- umbilical artery dopplers (if conservative management planned)
- Do not repeat more than every 2 wks

CTG

- Carry out at diagnosis
- Perform daily as an inpatient
- Repeat if any of:
  - change in FMs reported by the woman
  - vaginal bleeding
  - abdominal pain
  - deterioration in maternal condition
- Do not repeat more than weekly if results of all fetal monitoring normal

Write a care plan that includes:

- Timing and nature of future fetal monitoring
- Fetal indications for both
- If/when corticosteroids should be given
- When discussion with NICU and anaesthetists should take place and what decisions should be made

Intrapartum care

Mild and moderate hypertension
(BP 140/90-159/109 mmHg)

- Measure BP hourly
- Continue antenatal hypertensive treatment
- Carry out blood tests according to antenatal period, even if regional analgesia being considered
- Do not routinely limit duration of 2nd stage of labour if BP stable

Severe hypertension
(BP ≥160/110 mmHg)

- See Appendix 5

If regional anaesthesia is required/ considered:

- See Appendix 8

Postnatal care

- Continue antenatal antihypertensive treatment
- If not antenatal hypertensive treatment, start antihypertensive treatment if BP ≥ 150/100 mmHg
- Measure BP:
  - Daily for first 2 days after birth
  - At least once 3-5 days after birth
  - As clinically indicated if antihypertensive treatment changed
- If methyldopa was used during pregnancy, stop within 2 days of birth
- If BP falls to <130/80 mmHg, reduce antihypertensive treatment
- Give patient information leaflet on "Hypertension in Pregnancy – Postnatal Information"

If woman breastfeeding

- Avoid diuretic treatment for hypertension
- Assess clinical wellbeing of baby, especially adequacy of feeding, at least daily for first 2 days after birth
- Offer woman information about safety of drugs for babies receiving breast milk (Appendix 7)

Follow-up care

- At transfer to community care, complete the PN hypertension discharge letter detailing medication, frequency of BP monitoring, thresholds for reducing or stopping treatment
- If antihypertensive treatment is to be continued, GP to review 2 wks after transfer to community care
- GP review at 6-8 wk PN review
- If antihypertensive treatment is to be continued after 6-8 wk PN review, GP to consider specialist assessment of hypertension

Appendix 4

Pre-eclampsia (PET)

Antenatal care

- A healthcare professional trained in management of hypertensive disorders of pregnancy should assess the woman at each consultation
- **Admit the woman to hospital**
- Do not repeat quantification of proteinuria
- Carry out fetal monitoring

Mild - moderate hypertension
(BP 140/90-159/109 mm Hg)

- Offer treatment if BP remains >140/90*
- Measure BP at least 4 times a day while inpatient
- If outpatient monitoring agreed, measure BP every 48 hours
- PET bloods (FBC, U&E, LFT) twice a week

Severe hypertension
(BP≥ 160/110 mmHg)

- Referral to CDS needed?

No

- Treat with 1st-line oral labetalol* to keep BP <135/85
- Measure BP more than 4 times a day depending on clinical circumstances
- PET bloods (FBC, U&E, LFT) 3 times a week

Yes

See page 16
Appendix 5

Timing of birth

Before 34 weeks

- Manage conservatively (do not plan same-day delivery of baby)
- Consultant obstetrician to:
  - Document maternal (blood results and clinical) and fetal indications for elective birth <34 wks
  - Write plan for antenatal fetal monitoring
- Offer birth (after discussion with NICU and anaesthetists and, if required, course of corticosteroids completed) if:
  - Severe refractory hypertension
  - Maternal or fetal clinical indication develops as defined in plan

34^{+0}-36^{+6} weeks

- Recommend birth after 34 wks if PET with severe hypertension, BP controlled and , if required, course of corticosteroids completed
- Offer birth at 34^{+0}-36^{+6} wks if PET with mild or moderate hypertension, depending on maternal and fetal condition, risk factors and availability of NICU

After 37^{+0} weeks

- Recommend birth within 24-48 hrs if PET with mild or moderate hypertension

Fetal monitoring

USS fetal growth & LV and umbilical artery dopplers

- Carry out at diagnosis if conservative management is planned
- Do not repeat more than every 2 wks

CTG

- Carry out at diagnosis
- Perform daily as an inpatient
- Repeat if any of:
  - change in fetal movement reported by the woman
  - vaginal bleeding
  - abdominal pain
  - deterioration in maternal condition

Care plan

Write a care plan that includes:

- Timing and nature of future fetal monitoring
- Fetal indications for birth
- If and when corticosteroids should be given
- When discussion with NICU and anaesthetists should take place and what decisions should be made

If results of any fetal monitoring abnormal, discuss with consultant

If allowed home then do not repeat CTG more than weekly if results of all fetal monitoring are normal

Intrapartum care

Mild and moderate hypertension (BP 140/90-159/109 mmHg)

- Tocolysis is contraindicated in preterm labour in women with PET
- Measure BP hourly
- Continue antihypertensive treatment
- Commence oral omeprazole 40mg 12 hourly whilst in labour
- Carry out blood tests if regional analgesia being considered
- Do not routinely limit duration of 2nd stage of labour if BP stable
- Syntocinon 10 iu IM following vaginal birth or Carbetocin 100mcg IV following Caesarean section should be administered

Severe hypertension (BP≥160/110 mmHg)

- See Appendix 5

If regional anaesthesia is required/considered:

- See Appendix 8

Postnatal care

- If methyldopa used to treat PET, stop within 2 days of birth
- Ask the woman about severe headache and epigastric pain each time BP measured
- If mild - moderate pre-eclampsia or after step-down from HDU, measure FBC, U&E and LFT 48-72 hrs after birth or step-down. Repeat as clinically indicated. Do not repeat if blood results normal
- Do not measure fluid balance if creatinine within normal range after step-down from HDU
- Offer transfer to community midwifery care if:
  - BP<150/100 mmHg
  - blood tests stable or improving **and**
  - no symptoms of PET

If woman breastfeeding

- Avoid diuretic treatment for hypertension
- Assess clinical wellbeing of baby, especially adequacy of feeding, at least daily for first 2 days after birth
- Offer woman information about safety of drugs for babies receiving breast milk (Appendix 7)

If no antenatal hypertensive treatment

- Measure BP:
- At least 4 times a day while inpatient
- At least once 3-5 days after birth
- On alternate days if BP abnormal 3-5 days after birth
- If BP ≥ 150/100 mmHg, start antihypertensive treatment

If antenatal antihypertensive treatment

- Continue antenatal antihypertensive treatment
- Reduce antihypertensive treatment if BP <130/80 mmHg
- Consider reducing if BP <140/90 mmHg
- Measure BP at least 4 times a day while inpatient

Follow-up care and postnatal review

At transfer to community care

- Fill in PN hypertension discharge letter detailing medication, frequency of BP monitoring, thresholds for reducing or stopping treatment
- Advise the woman about self monitoring of symptoms
- Measure BP every 1-2 days for up to 2 wks, until antihypertensive treatment stopped and no hypertension
- Women who are still on antihypertensive treatment 2 wks after transfer to community care should be advised to see their GP for review
- If blood tests improving but within abnormal range, or not improving relative to pregnancy ranges, repeat FBC,U&E and LFT as clinically indicated
- Give patient information leaflet. Hypertension in Pregnancy – Postnatal Advice

The following women should be offered a 6-8 wk PN review with their consultant obstetrician:

- Women with PET who were delivered ≤ 28 wks
- Women who were admitted to ITU
- Women who have had eclampsia
- Women with HELLP

At PN review (6-8 wks after birth)

- All women should be advised to see their GP for review
- GP to consider specialist referral if antihypertensive treatment still needed
- Repeat FBC, U&E and LFT if indicated
- Dipstick urinalysis. If proteinuria:
  - GP to offer further review at 3mths to assess renal function
  - GP to consider referral for specialist renal assessment

Appendix 5

Severe hypertension, severe pre-eclampsia and eclampsia

Criteria for referral to CDS (Critical Care)

- BP≥160/110 mmHg +/- proteinuria
- Eclampsia
- Severe PET**

Features of severe PET:**

- Severe hypertension + significant proteinuria
- Mild or moderate hypertension + significant proteinuria with ≥ one of:
  - Severe headache, visual disturbance
  - Severe pain just below ribs or vomiting, liver tenderness
  - Papilloedema
  - Signs of clonus (>3 beats)
  - HELLP syndrome
  - Plts <100
  - ALT >70

Immediate management

- Immediate review by ST3-7
- Assess BP, RR, HR, O_2 sats
- Commence Critical Care chart
- Treat hypertension (see page 17)
- Urinalysis +/- uPCR
- iv access
- FBC, U&E, LFT, clotting, G&S
- Examine for signs
  - Epigastric tenderness, oedema
  - Clonus, Hyperreflexia
  - Papilloedema

- If undelivered and gestation ≥ 26 wks consider continuous CTG
- Maintain O_2 sats >95%
- 4 hourly temperature recording
- See fluid balance page 20
- Hourly urine output (>25ml/hr)
- FBC, U&E, LFT, clotting (if Plts <100) at a min of 12-24hrs
- Inform consultant obstetrician, anaesthetist, neonatologist and CDS MW co-ordinator
- The team leader is the consultant obstetrician
- The plan is to be clearly documented in the handheld record
- The woman should have adequate verbal information from the team to make informed choices and she should be included in all decisions involving labour and delivery
- The NICU must be informed ASAP about plans for delivery and offered an opportunity to discuss care of the baby with the woman
- The woman must be cared for on CDS with observations plotted on Obstetric Critical Care Care chart

Management of severe hypertension (BP≥160/110)

- Progress and management plans must be accurately handed over between shifts and the CDS MW co-ordinator informed immediately if any deteriorations
- Reviewed twice daily by a Consultant Obstetrician and Senior Anaesthetist
- Reviewed at least 4 hourly by an ST1-7
- All reviews and plans must be clearly documented and signed in the notes
- Continue antenatal hypertensive treatment
- **AND** treat women admitted to Obstetric Critical Care during pregnancy or after birth (BP≥160/110) immediately with one of:
    - Labetalol 200mg stat orally
    - Nifedipine10mg capsule orally
    - Labetalol intravenously (see Appendix 6)
    - Hydralazine intravenously (see Appendix 6)
- Measure BP every 15mins during treatment and then every 30mins once controlled
- Monitor response to treatment to:
    - Ensure BP falls
    - Identify adverse effects for woman and fetus
    - Modify treatment according to response
- Consider using ≤ 500mls crystalloid fluid before or at the same time as 1st dose of hydralazine in antenatal period
- Aim to keep BP <150/80-100 mmHg
- If BP controlled within target ranges, do not routinely limit duration of 2nd stage of labour
- If BP does not respond to treatment, advise operative birth
- Inform consultant obstetrician, anaesthetist and NICU
- Stop aspirin
- Do NOT use LMWH until the BP is controlled (see VTE assessment form)

Prevention of seizures

- Consider $MgSO_4$ if birth planned within 24 hrs in woman with severe PET
- Give $MgSO_4$ if woman with severe hypertension or severe PET has or previously had eclamptic fit
- To be administered as per regimen below
- To be continued for 24 hrs after birth or after last seizure, unless medically indicated to discontinue earlier

LOADING DOSE:
Magnesium sulphate 4g (use 20ml syringe)

- 4g (8mls of 50% MgSO4 in 12mls 0.9% normal saline= total 20mls)
- Give iv over 5 mins

MAINTENANCE DOSE:
Magnesium sulphate 1g per hour (use 50ml syringe)

- 10g (20mls MgSO4 in 30mls 0.9% normal saline= total 50mls)
- Give iv using syringe driver at rate of 5mls/hr

RECURRENT SEIZURES WHILST ON MAGNESIUM:
Bolus dose:

- 2g (4mlsl of 50% $MgSO_4$ in 6mls 0.9% normal saline= total 10mls)
- Give iv over 5 mins

- If possible take blood for magnesium levels before bolus
- Consultant anaesthetist support to be sought

- Hourly monitoring
  - Deep tendon reflexes
    - If loss of reflexes STOP infusion and send levels
    - Recommence infusion if level <4mmol/l or reflexes return at 0.5g/hr
  - Urine output
    - If urine output <100mls/4 hrs or urea>10 then magnesium levels should be taken 4-6 hrly (therapeutic range 2-4mmol/l)
  - Respiratory rate
    - If RR < 14 per min STOP infusion and refer to ST6-7 or consultant
    - If O_2 sats < 95% this could indicate pulmonary oedema
- Continue $MgSO_4$ a rate of 1g/hr unless:
  - Magnesium levels > 4mmol/l: STOP infusion and seek consultant opinion
  - Magnesium levels < 1.7mmol/l: give further bolus of 2g over 20mins and increase maintenance dose by 0.5-1.0g/hr

EMERGENCY PROTOCOL
CARDIOPULMONARY ARREST ON MAGNESIUM SULPHATE

- STOP magnesium sulphate infusion
- START Basic Life Support
- GIVE 1g calcium gluconate iv (10mls 10% solution) over 10 mins
- Intubate early
- Ventilate until respirations resume

ECLAMPSIA EMERGENCY PROTOCOL

- CALL for HELP
- Emergency bell
- Call 2222 and ask for obstetric emergency team

- AIRWAY
  - Left lateral
  - Clear and open airway
  - Insert airway if needed
- BREATHING
  - Check for breathing
  - High flow O_2 (15 l/min) via face mask
- CIRCULATION
  - Check maternal pulse
  - Insert cannula
  - Take blood (FBC, U&E, LFT, clotting, G&S, ?magnesium level)
  - Displace uterus

- Magnesium sulphate loading dose (see algorithm)
- Inform consultant obstetrician and anaesthetist
- Consider other causes of fits eg intracranial haemorrhage
- Neurological examination
- Consider imaging of the head
- Delivery should be undertaken once the woman is stable if undelivered
- Complete an eAIMS form

Fluid balance

In women with severe PET:

- Fluid restrict to 1ml/kg/hr or 80ml/hr
- Strict fluid balance to be recorded on the HDU chart

- If oral intake is adequate then iv fluids are not necessary
- Use Hartmanns solution as 1st line iv fluid
- Do not pre-load with iv fluids before establishing low-dose epidural analgesia or CSE
- Limit maintenance fluids as above unless there are other ongoing fluid losses (eg haemorrhage)
- Do not use volume expansion unless hydralazine is antenatal antihypertensive
- If syntocinon is needed post-delivery then use 40IU in 40mls of normal saline to be infused at 10ml/hr

Management of oliguria

- Clinical review
  - ?sepsis
  - haemorrhage
  - ?pulmonary oedema
- FBC, U&E, LFT
  - ?HELLP
- Check urinary catheter
- O_2 sats
- Reduce magnesium sulphate infusion (to avoid toxicity)
- Consider stopping other drugs excreted by kidney

Urine output < 25ml/hr for 2hrs

- Maintain close observation
- Continue with iv fluid restriction
- ?can stop syntocinon infusion

Urine output < 10ml/hr for 2 hrs

- Consider fluid challenge with 250ml iv Hartmanns
- Consider CVP line
- Liaise with consultant anaesthetist
- CVP <0 mmHg
  - 250ml bolus iv Hartmanns over 30mins
  - Reassess
- CVP 0-5 mmHg
  - Continue 1ml/kg/hr or 80 ml/hr
  - Monitor CVP hourly
  - If remains oliguric call consultant
- CVP> 5 mmHg
  - Give furosemide 10-20mg iv
  - If urine output >200ml/hr consider fluid replacement

Management of pulmonary oedema

Diagnosis:
- ↑RR
- Crepitations on chest auscultation
- ↓O_2 sats
- ↑O_2 requirements

Treatment:
- Act promptly
- Discuss care with consultant obstetrician and anaesthetist
- Consider need for ITU care
- Sit upright
- Give high flow O_2 by face mask with a reservoir bag
- Give furosemide (40mg by slow iv)
- Stop fluid infusions
- Check fluid balance
- Monitor pulse, BP, RR and O_2 sats
- Check for evidence of magnesium toxicity
- Monitor conscious state
- Full cardio-respiratory examination
- ECG, CXR, ABG if O_2 sats < 90%
- Consider need for cardiac enzymes and NTproBNP
- Consider need or cardiac ECHO

If no improvement, discuss value of CPAP ventilatory support

Corticosteroids

If birth likely within 7 days in woman with PET:
- Give 2 doses of betamethasone 12mg im 24 hrs apart between 24-3 wks
- Consider giving 2 doses of betamethasone 12mg im 24 hrs apart at 35-36 wks

Mode of birth

LSCS versus IOL
- Consultant decision
- Choose mode of birth according to clinical circumstances and woman's preference
- Consider delivery once the woman is stable

Intrapartum care

First stage:
- Maintain close observations on an Obstetric Critical Care Chart Chart
- Avoid aorto-caval compression as may cause profound fall in BP
- Avoid fluid overload
- Consider epidural analgesia
- Continuous CTG
- Tocolysis is contraindicated
- Start oral ranitidine 150mg 6 hrly

Second stage:
- If BP controlled within target ranges, do not routinely limit duration of 2nd stage of labour
- If BP not controlled then consider an operative delivery
- Check BP every 15 mins

Third stage:
- Avoid ergometrine and syntometrine
- Use Syntocinon 10 iu IM or 5 iu via slow iv injection following vaginal birth or Carbetocin 100mcg IV following Caesarean section
- If risk of PPH or PPH develops then start iv syntocinon 40 IU in 40mls of normal saline at 10ml/hr

Puerperium:
- Consultant obstetrician to formulate management plan
- Woman to stay on CDS for at least 12hrs post delivery
- Most women will need inpatient stay for 4 days
- Maintain close observations
- Aim for BP ≤150/ 80-100 mmHg
- Repeat bloods at 4 and 24 hrs post delivery as a minimum
- Complete VTE assessment form
- GECS
- Clexane can start 24 hrs post delivery if Plts >100
- Do not give NSAIDS
- Breastfeeding is not contraindicated
- Ensure a clear verbal and written communication, plans and parameters for discharge

Postnatal:
- See PN guidance for PET

Back to top

Appendix 6

Antihypertensive treatments

First line agent: Labetalol (oral)

Ensure no contraindications:

- Asthma of any severity
- Evidence of cardiac dysfunction (eg pulmonary oedema)
- Can be used with moderate liver dysfunction associated with HELLP
- Avoid if a strong suspicion of phaeochromocytoma

Oral dose:

- Labetalol 200mg orally and repeat BP in 30 mins
- If BP not controlled then a further labetalol 200mg
- If not controlled and not severe then consider Adalat Retard 20mg stat
- If not controlled and severe then consider labetalol iv or hydralazine
- A usual starting regime would be labetalol 200 mg bd

Nifedipine (oral)

Ensure no contraindications:

- Do not use with aortic stenosis
- May cause thrombocytopenia
- Increases blood loss at surgery
- May have an effect on uterine contractility

Oral dose:

- If moderate hypertension then consider Adalat Retard 20mg stat
- If severe hypertension or BP not controlled after 30min then consider nifedipine 10mg capsule (not sublingually)
- A usual regular regime would be Adalat Retard 20mg bd

Second line: Intravenous labetalol

Loading dose (IV)

- Give 50 mg (10mls of 5mg/ml neat solution) over at least 1 min – BP should fall below threshold within 5 mins
- Repeat at 15 mins intervals to a max dose of 200mg until BP is controlled

Maintenance dose (IV infusion)

- Infusion via syringe pump at rate of 4ml/hr (5mg/ml neat solution). Double every 30 mins to a max of 32 mls/hr (160mg) until BP is controlled. Titrate to keep DBP 90 -100 mmHg and SBP 140 –150 mmHg

Third line

Hydralazine

Ensure no contraindications:

- Causes tremor
- Worsens systemic lupus (avoid)
- Increased risk of fetal bradycardia compared to other antihypertensives

Loading dose

- Dilute 50mg hydralazine (powder) with 50mls of Normal Saline
- Give 5mls (5mgs) over 15 mins via Syringe driver (pump at a rate of 20mls /hr
- Check BP after 20 mins. If DBP > 100 mmHg give further 5mls (5mgs) over 15 mins (pump rate of 20mls/hr)

Maintenance dose

- Dilute 50mg hydralazine (powder) with 50mls of Normal Saline. Set syringe pump to rate of 5mls/hr (5mgs/hr) (pump rate of 5mls/hr)
- Titrate to keep DBP 90 -100mmHg and SBP140 – 150 mmHg. Usual maintenance dose 2-3mgs/hr (2-3mls/hr). Maximum dose 18mg/hr. (18mls/hr)
- Reduce if significant side effects or maternal pulse > 120 bpm

Appendix 7

Breastfeeding

No adverse effects on babies receiving breast milk:

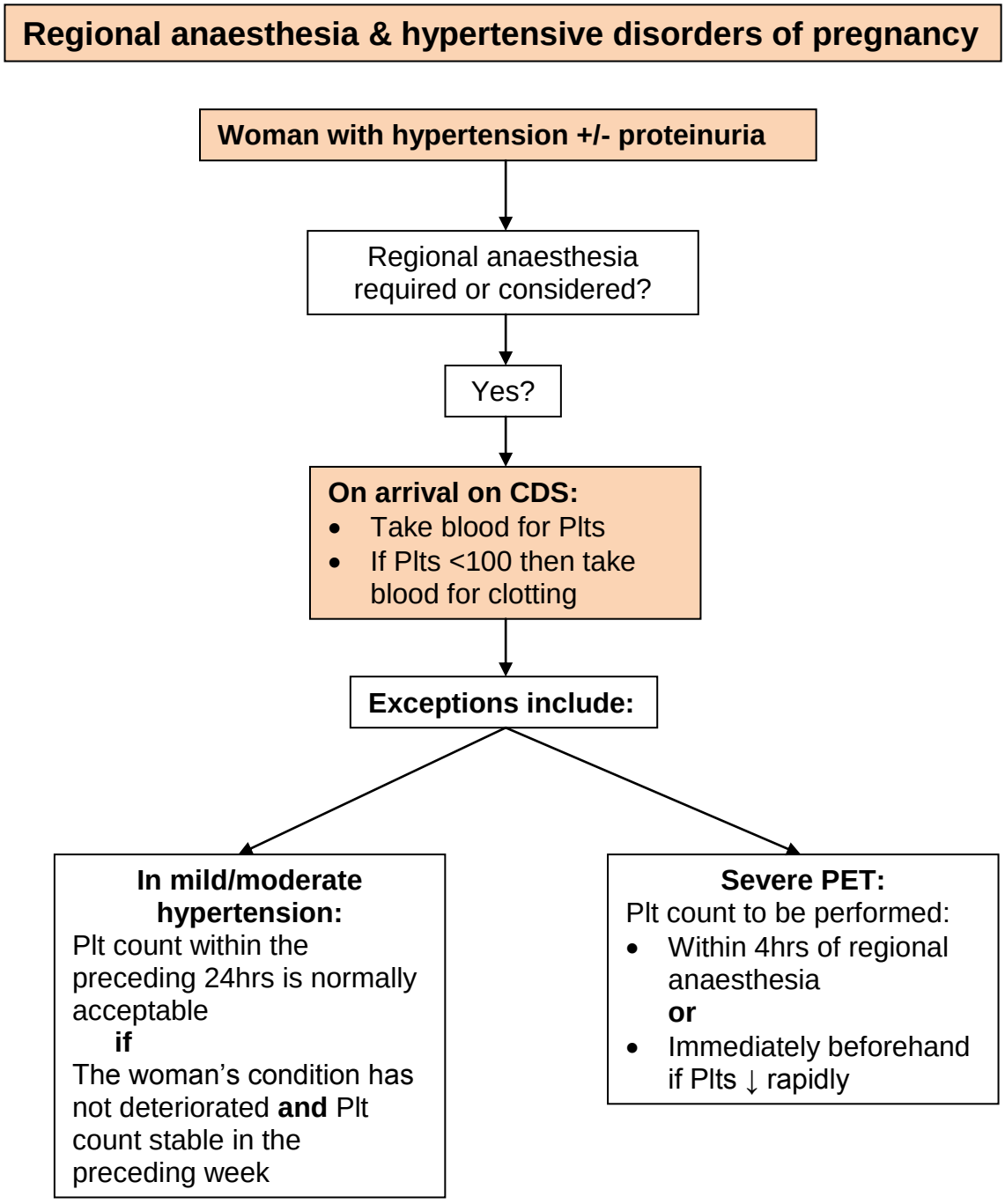
- Labetalol
- Nifedipine
- Enalapril
- Captopril
- Atenolol
- Metoprolol

Insufficient evidence on the safety of the following drugs in babies receiving breast milk:

- ARBs
- Amlodipine
- ACE inhibitors other than enalapril and captopril

Back to top

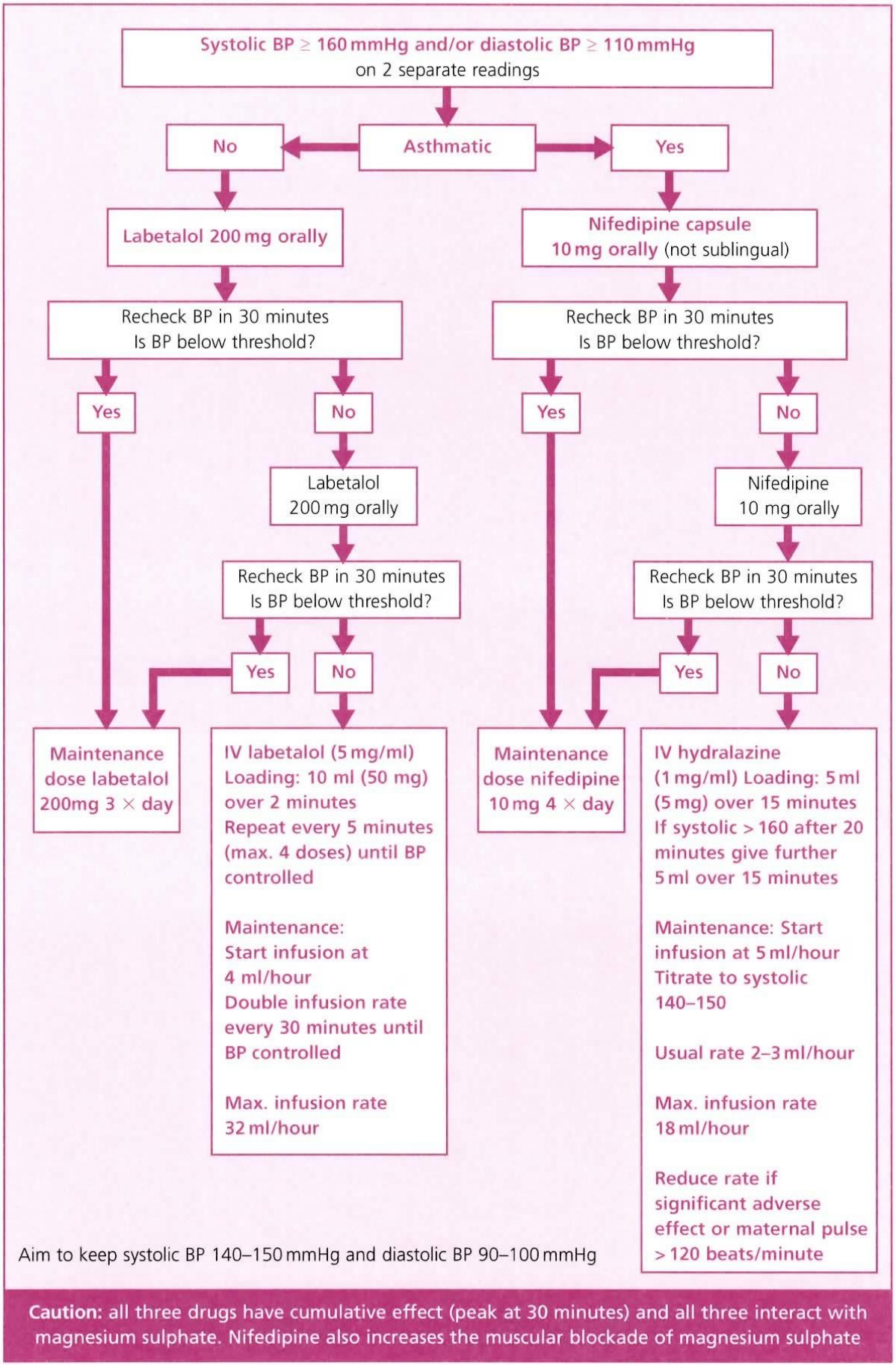
Appendix 8



Back to top

Appendix 9

Algorithm for management of Severe Hypertension



Practical Obstetric MultiProfessional Training Course Manual 2012, RCOG Press

Women and Children's Health

North Bristol NHS Trust

Postnatal discharge for woman with hypertension in pregnancy.

Date

Patient ID Sticker

Dear Dr

Your patient had hypertension in pregnancy or the postnatal period and has been discharged into the community today.

She delivered on:…… at ……weeks gestation

Her blood pressure on discharge is:

We made the diagnosis of:

- ☐ Essential hypertension
- ☐ Pregnancy induced (gestational) hypertension
- ☐ Pre eclampsia/ severe pre eclampsia
- ☐ HELLP syndrome

Her current antihypertensive medication is:

Medication	Dose	Frequency

- The midwife will monitor her BP in line with NBT guidelines, unless out of area.
- If she is still requiring antihypertensive medication after two weeks, you will need to continue to manage and monitor.

☐ She did not have significant proteinuria

☐ She had significant proteinuria and we would suggest checking her urine dipstick at 6-8 weeks postnatal.

Her most **recent blood tests** are normal/abnormal (please circle)

Normal Range	**Blood test**	**Date**	**Date**
44-73	Creatinine		
6-32	ALT		
11-14	Haemoglobin		
150-400	Platelets		

We would suggest repeating the bloods in:

☐ We have not arranged a formal follow up for her at the hospital

☐ We have arranged to review her in the clinic in 6-8 weeks

We hope this information is helpful to you for her management in the community setting.

Yours sincerely

Name in capitals

Position

Patient Information can be accessed:
nww.avon.nhs.uk/dms

Ratified PNCT March 2011 Review March 2014
Revised PNCT October 2011

Back to top

Audit and Monitoring

The audit will include the current CNST level 3 Maternity standards and sample size.

The audit will be undertaken by a designated person nominated by the Maternity Audit team, to ensure compliance with current CNST Maternity Standards.

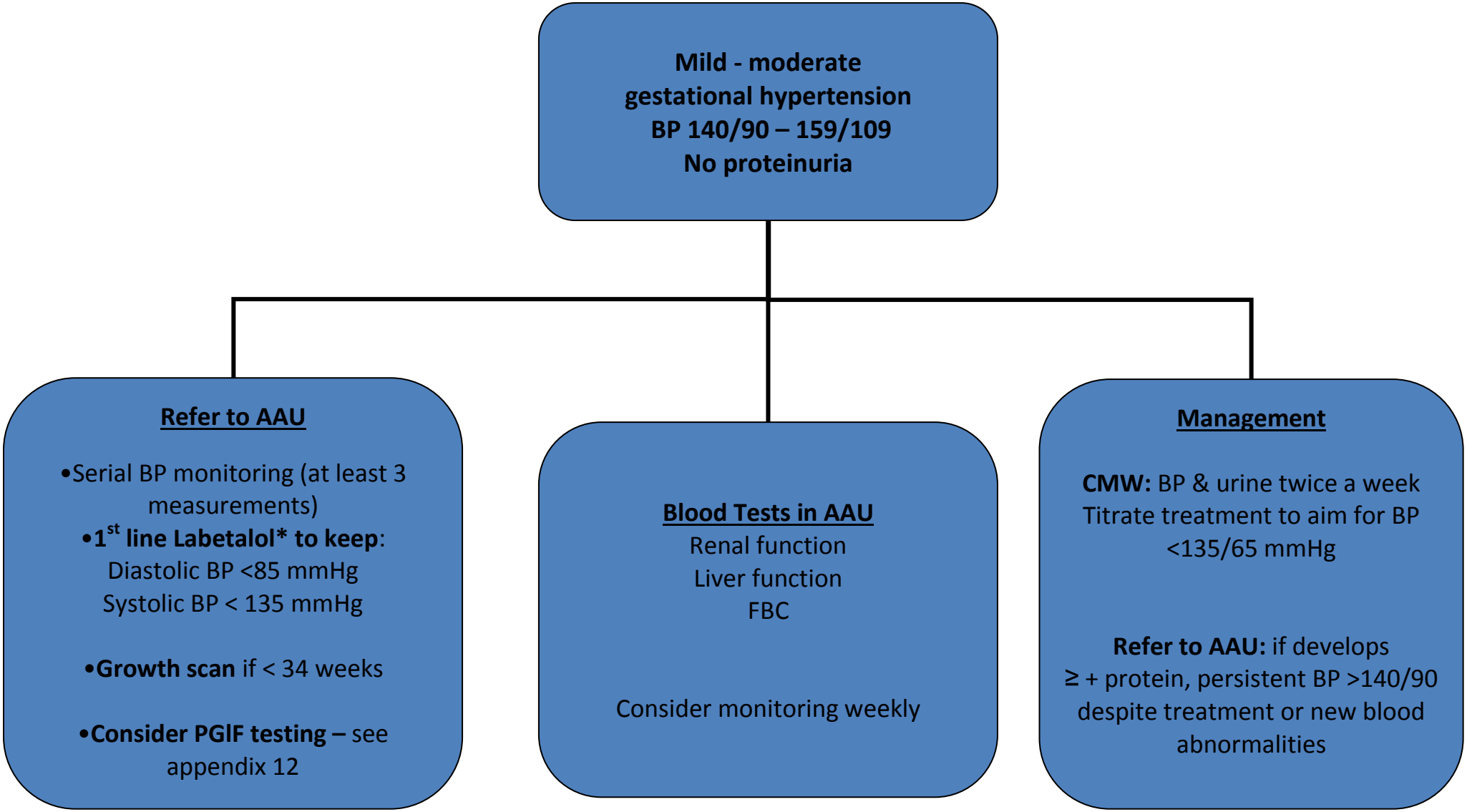
The sample size and data collection period will be identified in the CNST maternity standards.

The audit will be carried out using the standardised audit tool and methodology as agreed by the maternity audit team and in line with the audit process.

The audit results will be presented to the multidisciplinary Obstetrics and Gynaecology Audit presentation meeting.

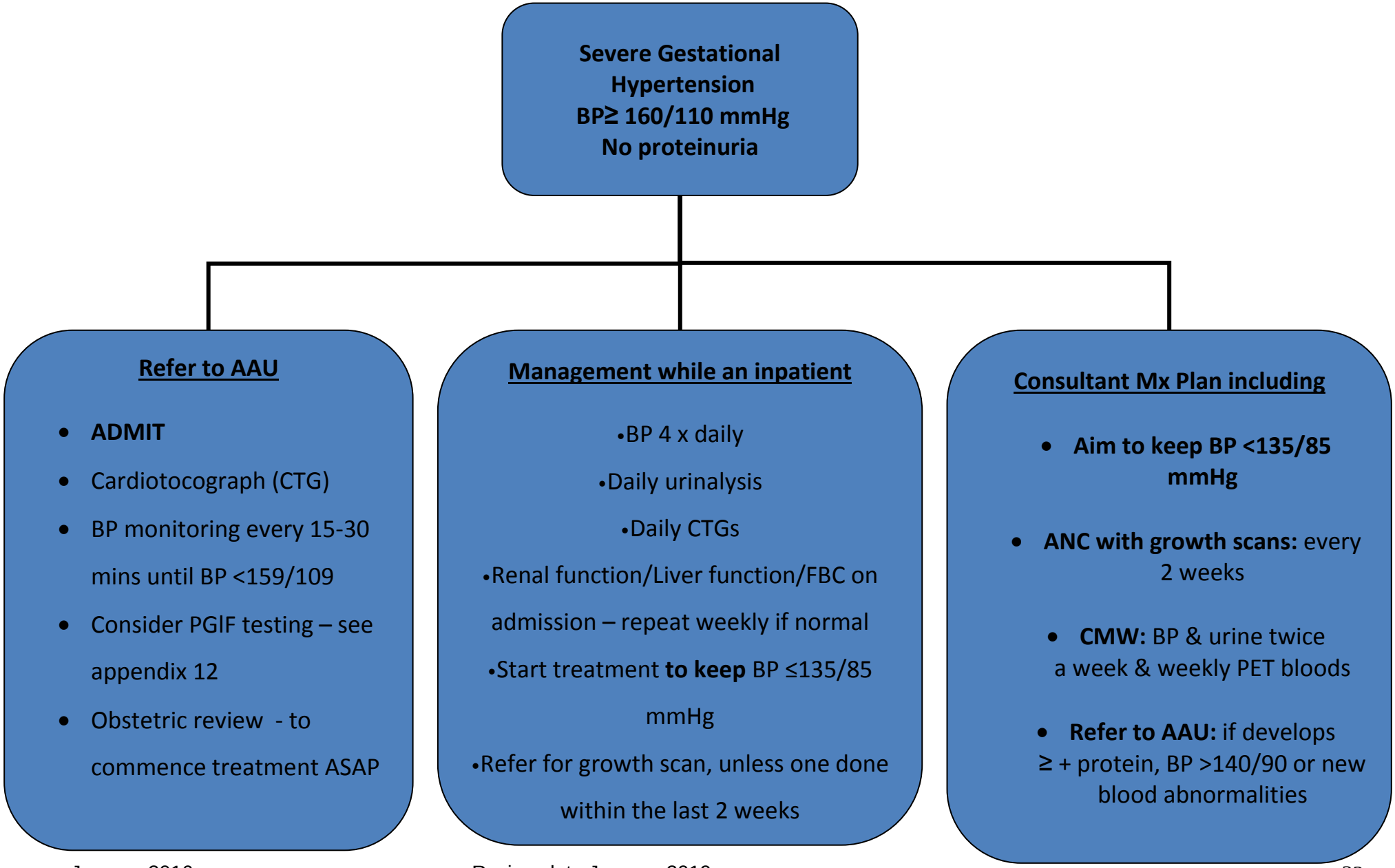
Where deficiencies are identified, an action plan will be developed by the Multidisciplinary Obstetrics and Gynaecology Audit presentation meeting. These action plans are implemented and monitored by the Intrapartum Clinical team, Antenatal clinical team, and Postnatal clinical team.

1st presentation of mild-moderate gestational hypertension



Back to top

Severe Gestational Hypertension



Pre –Eclampsia with mild-moderate hypertension

Mild-moderate hypertension
BP 140/90-159/109mmHg
+
significant proteinuria
(PCR greater than 30 mg/mmol)

Refer to AAU

- CTG on admission
- Treat BP to maintain ≤135/85 mmHg
- Send FBC/U&Es/LFTs
- Growth USS unless done in last 2 weeks
- **ADMIT**

Management while inpatient

•BP 4 x daily

•Daily CTGs

•Renal function/Liver function/FBC twice a week

•Treat BP to maintain ≤135/85 mmHg

•If >37/40 – offer delivery within 24-48 hours

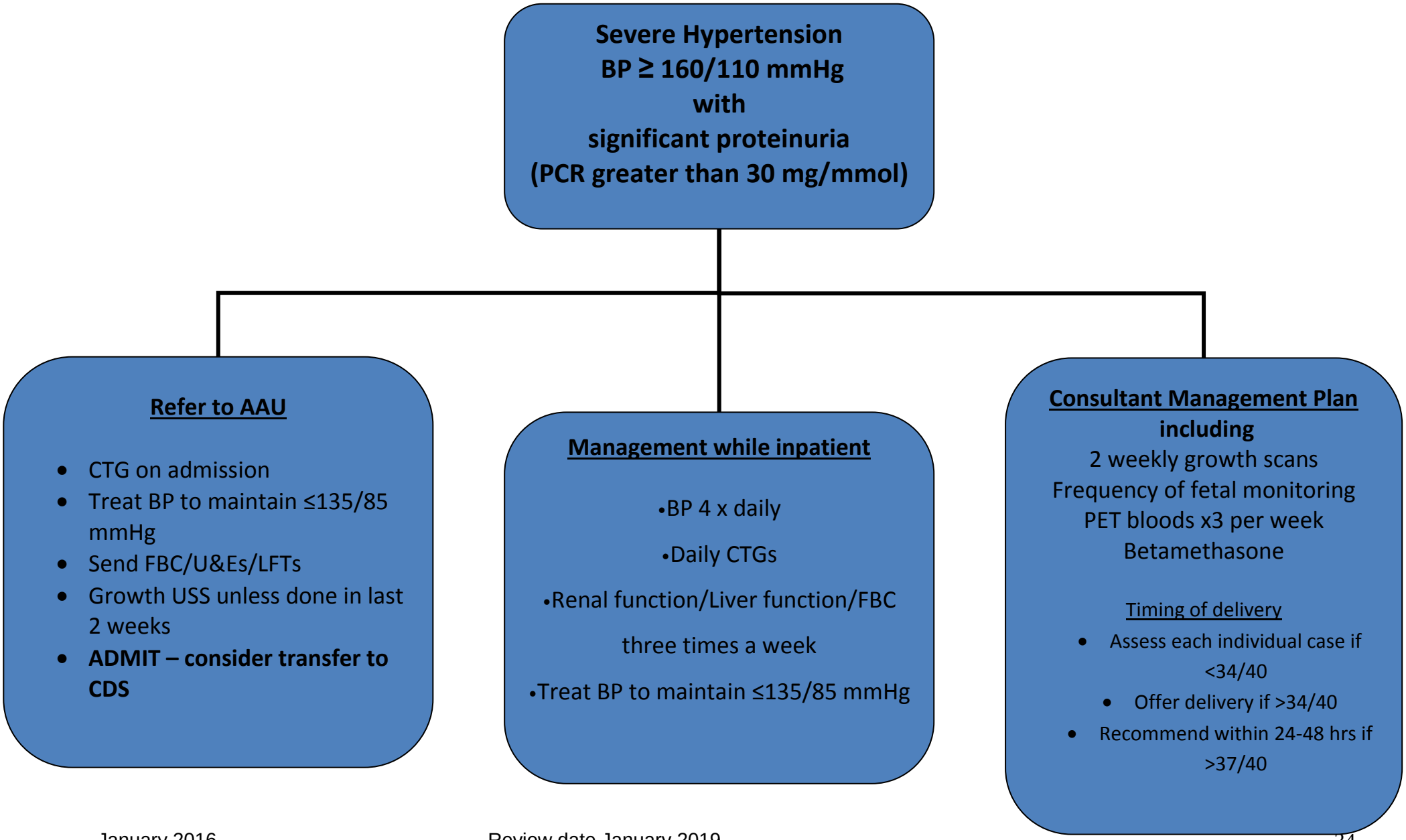
Consultant Mx Plan including

- 2 weekly growth USS
- PET bloods twice weekly
- BP monitoring 48 hourly if outpatient
- Consideration of steroids

Timing of delivery

- Consider if >34/40
- Deliver with 24-48hrs if >37/40

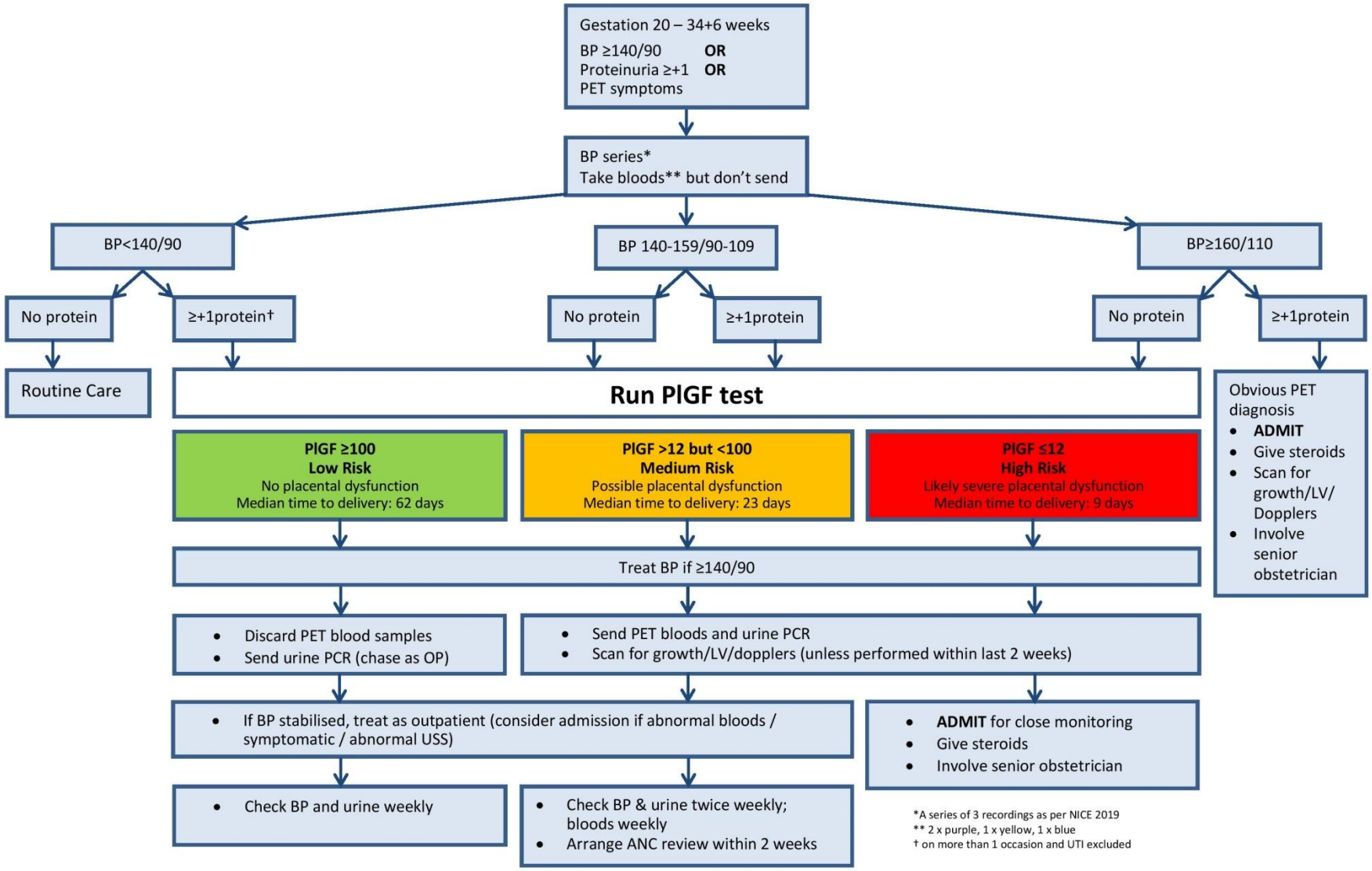
Pre –Eclampsia with severe hypertension



Appendix 12

Investigation and Management Guidance of Suspected Pre-eclampsia
< 35 weeks gestation

North Bristol NHS Trust



References

Confidential Enquiries in to Maternal Deaths in the United Kingdom. (2011). Saving Mothers Lives: Reviewing Maternal Deaths To Make Motherhood Safer: 2006-2008. London: Wiley-Blackwell. Available at http://onlinelibrary.whiley.com

National Institute for Health and Clinical Excellence (NICE). (2019). Hypertension In Pregnancy: The Management Of Hypertensive Disorders During Pregnancy. London: NICE. Available at www.nice.org.uk

Practical Obstetric MultiProfessional Training (PROMPT). 2nd Edition 2012. RCOG Press.

Royal College of Obstetricians and Gynaecologists. (2006) The Management of Sever Pre-Eclampsia/Eclampsia. London: RCOG. Available at: www.rcog.org.uk

World Health Organisation. (2011) WHO Recommendations For Prevention and treatment of Pre-Eclampsia And Eclampsia. Switzerland: WHO. Available at: http://www.who.int

Blood Results and tracking

– This is a generic appendix and should be used in conjunction with clinical picture which includes gestation. All clinical areas should have tracking registers

	Examples of blood samples	Actions for following up results
Routine samples	Routine booking bloods Routine MSU Repeat antibodies and FBC @ 28 weeks.	Results followed up within 10 working days- mothers advised of abnormal results by telephone and appropriate care and treatment provided. If ≥24 weeks – the Virology lab should be contacted to arrange for the result to be reported within 24 hours of the sample being taken Normal results documented in hand held records at next contact (community ANC). Complete all fields of the tracking register and actions undertaken
	Screening bloods (IDPS/SC&T)	See Antenatal Screening Guidelines re: tracking of results and the communication of screen positive results
	GTT	Results available within 3 working days
	Newborn screening test	Results should be available within 10 working days- CMW needs to ensure that lab have received the sample prior to transferring care to Health Visitor
Urgent samples- use clinical judgement	PET, PCR, LFTs, SBR	Bloods must be labelled urgent and will need to be processed within 12-24 hours, if working day ending consider liaising with Assessment centre or home birth midwife for them to look up in evening, notify woman of results and arrange ongoing care. Complete tracking register
Exceptional samples	Parvovirus CMV Toxoplasmosis Chicken pox	Look up daily until result is available, should be available Usually available within 7 working days of sample receipt in laboratory. Notify woman as soon as possible once results are available regardless normal or abnormal- Complete tracking register

ADDRESSOGRAPH

NAME……

HOSP NO……

DOB……

ECLAMPSIA PROFORM

DATE…… TIME OF SEIZURE…… DURATION OF SEIZURE……

PERSONS PRESENT AT ONSET OF SEIZURE……

EMERGENCY BELL ACTIVATED YES / NO TIME…….. RESPONSE TIME……

If emergency bell not activated, please give reason……

	NAME	**ALREADY PRESENT (√)**	**TIME INFORMED**	**TIME ARRIVED**
EXPERIENCED OBSTETRICIAN (ST3 and above)				
MIDWIFE COORDINATOR				
ANAESTHETIST				
JUNIOR OBSTETRICIAN				
HCA				
OTHER PERSONS ASSISTING				

CONSULTANT OBSTETRICIAN INFORMED YES / NO
Name……

If no, give reason……
……
Time attended (if attended)……

TREATMENT

LEFT LATERAL POSTION YES / NO TIME…… If no, other position……..

HIGH FLOW O_2 YES / NO TIME…… If no, give reason……

IV ACCESS YES / NO TIME…… If no, give reason……

BLOODS— GROUP + HOLD FBC, CLOTTING, U+E's, LFT's, URATE YES / NO TIME…… If no, give reason……

MAGNESIUM SULPHATE INFUSION (see laminated regimen for dosages)	**TIME COMMENCED**
LOADING DOSE	
MAINTENANCE DOSE	

INITIAL POST SEIZURE OBSERVATIONS TIME……...

RESP RATE……. PULSE RATE……... BP……..mm/Hg O2 sats…….% TEMP……^{0}C

URINARY CATHETER INSERTED YES / NO TIME…… If no, give reason……

(Commence High Dependency Chart)

FETAL WELLBEING (if appropriate) FETAL HEART RATE…..…….bpm TIME……..

POST SEIZURE CTG PERFORMED YES / NO NORMAL / SUSPICIOUS / PATHOLOGICAL

If CTG not performed, give reason……

Please complete AIMS form and attached copy of this proforma – Version 1 June 2010

Back to top