Women & Children’s Health

Maternity Guideline

**Hypertension in Pregnancy**

**Includes Management of Severe Pre-Eclampsia and Eclampsia**

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| **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 |

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| --- | --- | --- | --- | --- | --- |
| **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 |
| Lisa Kirk |  | 6.1 | Change to Proteinuria management | PNMR | 2022 |

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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)

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* *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.

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# 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)

O2 -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 -Weeks[Back to top](#_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

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# 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, perform a wash down sample. If proteinuria is still present, a PCR should be sent by the CMW. The results should be followed up the next day with urgent referral to AAU if raised”
* 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.

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# 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.

1. **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.

1. **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).

1. **Other pharmaceutical agents**

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

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

1. **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

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# Appendix 1

**Moderate and high risk of pre-eclampsia**

**Antenatal care and fetal monitoring**

**Risk factors for pre-eclampsia**

*Moderate*

* 1st pregnancy
* Aspirin taken during a previous pregnancy
* Age ≥ 40 years at booking
* Pregnancy interval >10 years
* BMI ≥35 at 1st visit
* Family history of PET in a first degree relative
* Multiple pregnancy

*High*

* Hypertensive disease during previous pregnancy
* Chronic kidney disease
* Autoimmune disease such as systemic lupus erythematosus or antiphospholipid syndrome
* Type 1 or 2 diabetes
* Chronic hypertension
* Confirmed placental dysfunction found on histology in a previous pregnancy
* Confirmed fetal growth restriction in a previous pregnancy
* Previous fetal loss over 20/40
* Previous AKI

If >1 high risk factor or ≥ 2 moderate factors for PET

**If previous:**

* Severe PET
* PET needing delivery < 34 wks
* PET with baby’s birth weight <10th centile
* Intrauterine death
* Placental abruption

Organise USS for growth and LV +/- dopplers where clinically indicated.

* Start at 28-30 wks, or at least 2 wks before previous gestational age of onset of hypertensive disorder if <28 wks
* Repeat 4 wks later

**Advise women to take aspirin\* 150mg a day in evening from 12 until 36 weeks gestation**

If fetal activity abnormal, carry out CTG

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**Chronic hypertension**

**Pre-pregnancy advice**

# Appendix 2

**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**

**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)

**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

**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

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**Intrapartum care**

**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 should be administered
* See Appendix 5

**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

If regional anaesthesia is required/considered:

* See Appendix 8

**Postnatal care**

**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)

**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”

**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

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Gestational hypertension

# Appendix 3

**Antenatal care**

**Carry out full assessment-**

* 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

**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 PGlF testing if <35/40 (see Appendix 12)
* Assess VTE risk

**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 PGlF testing if <35/40 (see Appendix 12)

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\*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)

**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

**Fetal monitoring**

**Severe hypertension**

**(BP ≥160/110 mmHg)**

**Mild and moderate hypertension**

**(BP 140/90-159/109 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

**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

**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

If results of any fetal monitoring abnormal, discuss with consultant

**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

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If regional anaesthesia is required/ considered:

* See Appendix 8

**Postnatal care**

**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)
* 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”

**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

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Pre-eclampsia (PET)

# Appendix 4

**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?

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**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

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See page 16 Appendix 5

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

**Fetal monitoring**

**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

**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

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

If results of any fetal monitoring abnormal, discuss with consultant

**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

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If regional anaesthesia is required/considered:

* See Appendix 8

**Postnatal care**

**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 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

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**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

Severe hypertension, severe pre-eclampsia and eclampsia

**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 aftertransfer 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

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**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

**Follow-up care and postnatal review**

# Appendix 5

**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, O2 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 O2 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

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**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)

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**Prevention of seizures**

* Consider MgSO4 if birth planned within 24 hrs in woman with severe PET
* Give MgSO4 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
* 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 O2 sats < 95% this could indicate pulmonary oedema
* Continue MgSO4 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

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% MgSO4 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

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**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 O2 (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

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**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
* O2 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

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**Management of pulmonary oedema**

Diagnosis:

* ↑RR
* Crepitations on chest auscultation
* ↓O2 sats
* ↑O2 requirements

Treatment:

* Act promptly
* Discuss care with consultant obstetrician and anaesthetist
* Consider need for ITU care
* Sit upright
* Give high flow O2 by face mask with a reservoir bag
* Give furosemide (40mg by slow iv)
* Stop fluid infusions
* Check fluid balance
* Monitor pulse, BP, RR and O2 sats
* Check for evidence of magnesium toxicity
* Monitor conscious state
* Full cardio-respiratory examination
* ECG, CXR, ABG if O2 sats < 90%
* Consider need for cardiac enzymes and NTproBNP
* Consider need or cardiac ECHO

**If no improvement, discuss value of CPAP ventilatory support**

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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

LSCS versus IOL

* Consultant decision
* Choose mode of birth according to clinical circumstances and woman’s preference
* Consider delivery once the woman is stable

**Corticosteroids**

**Mode of birth**

Post natal

Consultant obstetrician to make a plan

HDU chart

Daily consultant review

Min ST3-7 review 4hrly

Postnatal plan to be documented prior to discharge from CDS to ward

Magnesium Sulphate to have finished prior to discharge

Woman needs to be fot for 4 hourly obs with a stable BP ≤150/80-100 mmHg

Complete postnatal VTE risk assessment

**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

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**Postnatal:**

* See PN guidance for PET

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# Appendix 6

**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

**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

**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

**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

Antihypertensive treatments

# 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

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# Appendix 8

Regional anaesthesia required or considered?

**Woman with hypertension +/- proteinuria**

**Exceptions include:**

**Severe PET:**

Plt count to be performed:

* Within 4hrs of regional anaesthesia

**or**

* Immediately beforehand if Plts ↓ rapidly

**In mild/moderate hypertension:**

Plt count within the preceding 24hrs is normally acceptable

**if**

The woman’s condition has not deteriorated **and** Plt count stable in the preceding week

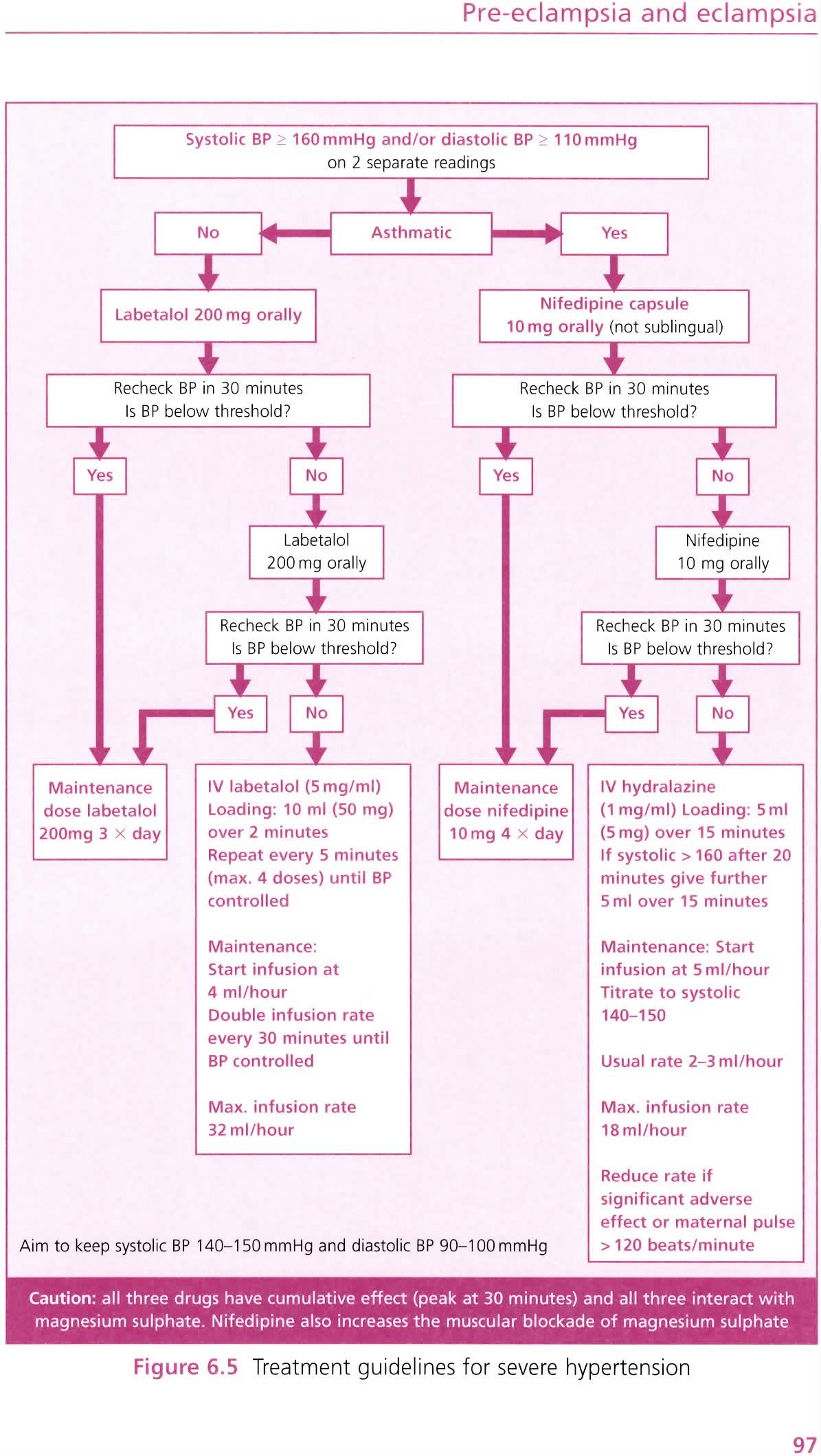
Yes?

**On arrival on CDS:**

* Take blood for Plts
* If Plts <100 then take blood for clotting

Regional anaesthesia & hypertensive disorders of pregnancy

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# Appendix 9

Practical Obstetric MultiProfessional Training Course Manual 2012, RCOG Press

Algorithm for management of Severe Hypertension

**Postnatal** discharge for woman with hypertension in pregnancy.

# Appendix 10

****

Patient ID Sticker

Date

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

|  |  |  |
| --- | --- | --- |
| Medicat Medication | Dose | FrequenFrequency |
|  |  |  |
|  |  |  |

Her current antihypertensive medication is:

* 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.

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

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

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

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Ratified PNCT March 2011 Review March 2014

Revised PNCT October 2011

# 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.

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1st presentation of mild-moderate gestational hypertension

**Mild - moderate   
gestational hypertension**

**BP 140/90 – 159/109**

**No proteinuria**

**Refer to AAU**

* Serial BP monitoring (at least 3 measurements)
* **1st line Labetalol\* to keep**:

Diastolic BP <85 mmHg

Systolic BP < 135 mmHg

* **Growth scan** if < 34 weeks
* **Consider PGlF testing –** see appendix 12
* **Refer routinely to ANC** if <37 weeks to discuss delivery timing

**Blood Tests in AAU**

Renal function

Liver function

FBC

Consider monitoring weekly

**Management**

**CMW:** BP & urine twice a week

Titrate treatment to aim for BP <135/65 mmHg

**Refer to AAU:** if develops   
≥ + protein, persistent BP >140/90 despite treatment or new blood abnormalities

# Appendix 11

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**Severe Gestational**

**Hypertension**

**BP≥ 160/110 mmHg**

**No proteinuria**

**Refer to AAU**

* **ADMIT**
* Cardiotocograph (CTG)
* BP monitoring every 15-30 mins until BP <159/109
* Consider PGlF testing – see appendix 12
* Obstetric review - to commence treatment ASAP

**Management while an inpatient**

* BP 4 x daily
* Daily urinalysis
* Daily CTGs
* Renal function/Liver function/FBC on admission – repeat weekly if normal
* Start treatment **to keep** BP ≤135/85 mmHg
* Refer for growth scan, unless one done within the last 2 weeks

**Consultant Mx Plan including**

* **Aim to keep BP <135/85 mmHg**
* **ANC with growth scans:** every 2 weeks
* **CMW:** BP & urine twice   
  a week & weekly PET bloods
* **Refer to AAU:** if develops   
  ≥ + protein, BP >140/90 or new blood abnormalities

Severe Gestational 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 mild-moderate hypertension

**Severe Hypertension**

**BP ≥ 160/110 mmHg**

**with**

**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 – consider transfer to CDS**

**Management while inpatient**

* BP 4 x daily
* Daily CTGs
* Renal function/Liver function/FBC three times a week
* Treat BP to maintain ≤135/85 mmHg

**Consultant Management Plan**

**including**

2 weekly growth scans

Frequency of fetal monitoring

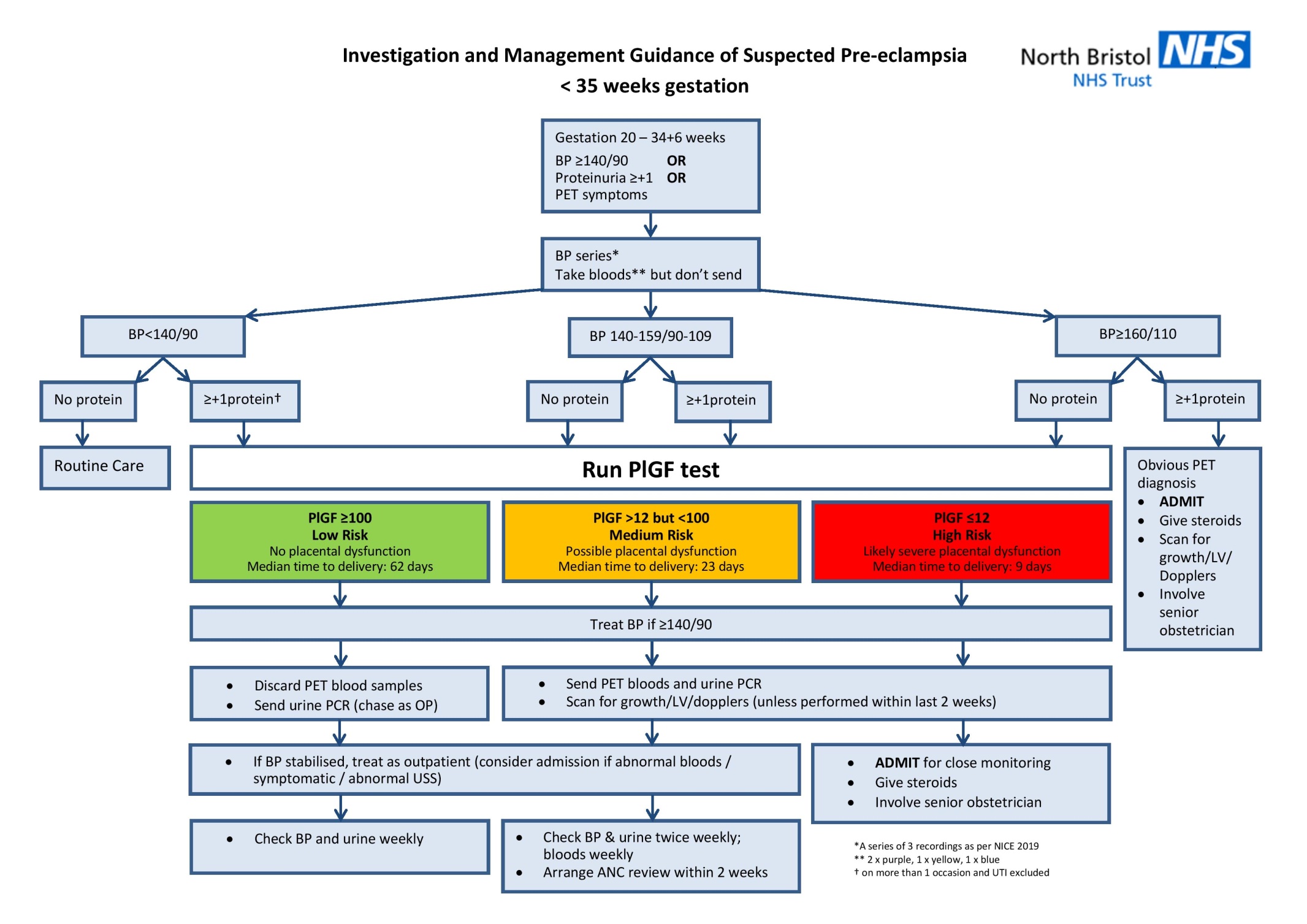
PET bloods x3 per week

Betamethasone

Timing of delivery

* Assess each individual case if <34/40
* Offer delivery if >34/40
* Recommend within 24-48 hrs if >37/40

Pre –Eclampsia with severe hypertension

 **Appendix 12**

# 

# References

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**Blood Results and tracking**

|  |  |  |
| --- | --- | --- |
|  | 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 |
|  |  |  |

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

ECLAMPSIA PROFORM

ADDRESSOGRAPH

NAME…………………………………

HOSP NO…………………………….

DOB………………………….

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 O2  YES / NO TIME…………… If no, give reason……………………………….

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

BLOODS— GROUP + HOLD YES / NO TIME…………… If no, give reason……………………………….

FBC, CLOTTING, U+E’s, LFT’s,

URATE

|  |  |
| --- | --- |
| **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..……0C

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………………………………………………………………………………………

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

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

If CTG not performed, give reason………………………………………………………………………………………

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

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

If CTG not performed, give reason………………………………………………………………………………………

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

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

If CTG not performed, give reason………………………………………………………………………………………

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

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

If CTG not performed, give reason………………………………………………………………………………………

**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**

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