HYPERTENSION IN PREGNANCY

1. Purpose	A policy to guide management of hypertensive disorders in pregnancy and the postnatal period.
2. Risk Rating	High
3. National Standards	1 – Clinical Governance 4 - Medication Safety 5 – Comprehensive Care 6 - Communicating for Safety 8 – Recognising and Responding to Acute Deterioration
4. Employees it Applies to	Obstetric Medical and Midwifery/Nursing Staff

CONTENTS:

Appendices

5. ABBREVIATIONS

BMI- Body mass index
PE- Pre- eclampsia
GH- Gestational hypertension
EH- Essential hypertension
OMC- Obstetric medicine clinic
OMP- Obstetric medicine physician
RAP- Risk Associated Pregnancy (High risk)
DAU- Day Assessment Unit
SGH- St George Hospital
WCH- White Coat Hypertension
SBP- Systolic blood pressure
DBP- Diastolic blood pressure
TSH- Sutherland Hospital

5.1 DEFINITIONS

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5.1.1 Hypertension in pregnancy is defined as:

SBP≥ 140 mmHg	and/ or	DBP ≥ 90 mmHg

- Severe Hypertension

SBP ≥ 160 mmHg	and/ or	DBP ≥ 110 mmHg

- Essential (or chronic) hypertension
  - Pre-existing hypertension or hypertension diagnosed prior to 20 weeks gestation

- White coat hypertension:
  - Elevated blood pressure in the presence of a clinician, which is normal on home blood pressure monitoring

- Gestational hypertension
  - The new onset of hypertension after 20 weeks gestation

- Preeclampsia: the presence of :
  - Hypertension and
    - Proteinuria or
    - Deranged renal or liver function, or
    - Thrombocytopaenia or haemolysis, or
    - Fetal growth restriction, or
    - Neurological signs and symptoms: Headache and visual scotoma, sustained clonus.

5.1.2 Antenatal Blood Pressure Measurement

- Sit the woman in a chair or on the edge of the bed with feet supported on a flat surface
- Record BP on the right arm, preferably using a validated mercury-free sphygmomanometer. Aneuroid Devices (with a pressure gauge) are not recommended as they are prone to errors in measuring BP (SOMANZ guidelines).
- If hypertension, always repeat the blood pressure again after 5 minutes
- A large cuff must be used when the mid upper arm circumference is ≥ 33cm, or a thigh cuff if arm circumference ≥ 44cm
- The cuff is to be placed directly on skin, so sleeves may need to be rolled up or removed
- The diastolic pressure is that at which the pulse sounds disappear (Korotkov 5)

5.2 MANAGEMENT OF AT-RISK WOMEN

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5.2.1 Risk factors for the development of preeclampsia (PE)

- Pregnant women considered to be at high risk of preeclampsia are those with:
  - Previous history of PE
  - Pre-existing diabetes (Type 1 or 2)
  - Antiphospholipid syndrome
  - Chronic hypertension
  - Chronic kidney disease
- Other risk factors include:
  - BMI >30
  - Assisted Reproduction Therapy

5.2.2 Aspirin for the Prevention of Preeclampsia

- High risk women (as above) need to start ideally prior to 16 weeks gestation:

150mg aspirin nightly

- Women with a combination of other risk factors: nulliparity, multiple pregnancy, family history of PE, obesity, age ≥40, can be considered for aspirin prophylaxis
- Aspirin may be ceased at 37 weeks but is safe to continue longer
- There is no increase in bleeding complications for women on low dose aspirin in pregnancy

5.2.3 Model of Antenatal Care

- High risk women should be seen in Risk Associated Pregnancy (RAP) and/or Obstetric Medicine Clinic (OMC) prior to 12 weeks gestation
- Women may continue in the RAP clinic, or return to their original model of care at the discretion of the RAP consultant
- See also SGH WCH CLIN027 *Risk associated Pregnancy (RAP) Team - Criteria for Allocation SGH*

5.2.4 Other important points

- All women with risk factors for the development of preeclampsia must have:

A urinalysis performed at each antenatal visit

5.3 REFERRAL TO THE OBSTETRIC MEDICINE PHYSICIAN

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5.3.1 Antenatal referral to the Obstetric Medicine Physician

- Women to be referred to the Obstetric Medicine Clinic (OMC) or to private Obstetric Medicine Physician (OMP) rooms during pregnancy:
    - Chronic hypertension or 'white coat' hypertension
    - Previous early onset preeclampsia which required delivery <32 weeks
    - Chronic renal disease or other chronic medical disorder
    - Established preeclampsia in current pregnancy
- This must be done using the Obstetric Medicine referral form (attached)

5.3.2 Acute referral to the Obstetric Medicine Physician

Women to be referred to OMP acutely:

- All women with preeclampsia
- Women with gestational hypertension (GH) when there is difficulty controlling BP requiring more than 2 antihypertensive agents at the discretion of the RAP consultant
- Women with acute severe hypertension
- At the discretion of the RAP Obstetrician

5.3.3 Women who do not require automatic referral

- Most cases of gestational hypertension
- Obstetric cholestasis (most cases)
- Ovarian Hyper-stimulation Syndrome (unless concerns about oliguria, fluid management or abnormal renal function - use protocol first)

5.3.4 24 hr Ambulatory and Home Blood Pressure monitoring

- Women with newly diagnosed hypertension <20 weeks should have a 24 hr ambulatory home blood pressure monitor (ABPM) prior to their OMC/ RAP appointment
    - Contact 9113 2621 to arrange
- The following women should have home blood pressure monitoring:
    - Women 'at risk' of recurrent preeclampsia or gestational hypertension
    - Women with chronic hypertension or white coat hypertension
    - Women with established gestational hypertension, or women with preeclampsia being managed as outpatients
- See section 5.6 and the appendix.

5.3.5 On-call arrangements (at SGH)

- Check the roster in 1South Maternity or the hospital medical roster to determine who the on call Obstetric Medicine Physician (OMP). It is often not the same as the on-call hospital nephrologist.

5.4 ANTENATAL DIAGNOSIS AND MANAGEMENT

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5.4.1 If hypertension is recorded in the antenatal clinic

- Always recheck the BP after 5 minutes
- If SBP ≥140 and < 160, or DBP≥ 90 and < 110
  - Perform urinalysis (UA)
  - If no proteinuria:
    - Refer for earliest DAU (AAU at TSH) if > 20 weeks gestation (see section 5.5)
    - Refer to Obstetric Medicine Clinic and the RAP clinic if < 20 weeks gestation,
      - Arrange 24 hr ABPM as per section 5.6
  - If ≥ +1 proteinuria and/or symptomatic of hypertension, arrange medical review and:
    - Send urine for protein: creatinine ratio (PCR), arrange FBC, UEC, LFT, Urate
    - Transfer to Birth Unit /PAU for urgent assessment (see section 5.4.2 below).
  - Manage as per '*Treatment of Hypertension'*

- If Severe hypertension (SBP ≥ 160 and / or DBP ≥ 110)
  - Transfer to Birth Unit for urgent assessment.

5.4.2 Assessment in Birth Unit/ PAU

- If SBP ≥140 and < 160, or DBP≥ 90 and < 110
  - Monitor blood pressure over 3 hours
  - Check urine and blood pathology results
  - If hypertensive, discuss with the RAP consultant and commence treatment as per section 5.7
  - If pre-eclampsia diagnosed, admit to 1 South and manage accordingly
  - If gestational hypertension diagnosed, arrange follow up in the DAU
  - If normotensive and no abnormalities in blood or urine tests:
    - Refer back to usual model of care
    - Perform a urinalysis each subsequent visit as increased risk of progression to hypertensive disorders later in pregnancy

- If Severe hypertension (SBP ≥ 160 and / or DBP ≥ 110)
  - Treat hypertension according to section 5.12
  - Admit and manage as per RAP consultant

5.5 DAY ASSESSMENT UNIT (DAU)

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5.5.1 Referral to the DAU

- DAU is conducted three mornings a week – Monday, Wednesday and Friday
- Women booked at SGH should be referred to DAU if they have:
  - Hypertension diagnosed after 20 weeks without proteinuria or other features of PE, where admission and delivery is not already indicated
  - Obstetric cholestasis not requiring delivery
- Women require a written referral by a medical officer with a provider number
- Contact 1South Maternity to arrange an appointment to the DAU (ext. 33145)
- Women booked at TSH will attend Antenatal Assessment Unit (AAU) at TSH and be referred to SGH as appropriate (see Criteria for Maternity Care at Sutherland and St George Hospitals CIBR)
- Refer to SGH-TSH WCH CLIN031 *Obstetric Cholestasis* for management of women referred to DAU with this.

5.5.2 Initial investigations of women referred to DAU with hypertension

- BP profile
- Urinalysis, send for spot protein: creatinine ratio (PCR) if ≥ +1 proteinuria
- FBC, UEC, LFT, Urate
- CTG
- Ultrasound for fetal growth/wellbeing (if there has not been a normal growth/wellbeing ultrasound performed within the previous 2 weeks)

5.5.3 Treatment of Hypertension in the DAU

- For mild- moderate hypertension, refer : *Treatment of Mild-Moderate Hypertension*
- If severe hypertension is diagnosed, call an **Obstetric Clinical Review** and manage as per: *Management of Severe Hypertension (Section 5.7).*

5.5.4 Follow-up

- Women who are normotensive in DAU have had transient gestational hypertension. They may be referred back to their original intending model of care, however they have a 40% risk of developing GH or PE.
- Women who are referred back to DAU for a second time should be considered for ongoing monitoring in the DAU
- Women diagnosed with pre-eclampsia will generally require admission
- Women with gestational or essential hypertension will require follow-up in the DAU or RAP and OMC clinics at the discretion of the attending consultants.

5.6 HOME BP MONITORING FOR WOMEN

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5.6.1 When to recommend 24 hr ABPM

At the 1st visit when there is

- A history of high BP predating the pregnancy OR
- Hypertension (≥140/90 mmhg) is discovered at the clinic

5.6.2 Arranging 24 hr ABPM

- Call the Hypertension Nurse on 91132621 to arrange
- If ABPM not feasible or available, then arrange home BP monitoring

5.6.3 When to recommend home blood pressure monitoring

- Any woman being seen because she is 'at risk' for recurrent pre-eclampsia/gestational hypertension
- All women with chronic hypertension or white-coat hypertension
- Women with established GH, or PE who are being managed as outpatients should also be considered

5.6.4 To do home BP monitoring

- Advise the woman to purchase or borrow whichever device the pregnant woman wishes, then check the device reading with her GP or with the midwife at clinic.
- Ensure a 'large cuff' is purchased/ obtained if the mid upper arm circumference is > 33cm
- Advise her each time to take 3 readings, seated, using the same arm every time:
    i. Ignore reading #1
    ii. Take 2 more readings 1 minute apart and average those 2 readings
    iii. Do this morning and evening any 3 days per week
    iv. Keep a record of the readings – dates, time & reading – on phone or paper
    v. Average all those readings and bring to each clinic visit

6 See appendix for instructions to give woman

5.6.5 Interpretation

- Home or 24 hr ABPM BP < 135/85 mmHg is considered adequate BP control in pregnancy

5.7 ANTENATAL MANAGEMENT OF WOMEN ADMITTED WITH HYPERTENSION

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5.7.1 Admission

- All women (except private patients) with hypertension in pregnancy will be admitted under the RAP obstetrician on call (SGH) or staff specialist (TSH)
- Women with preeclampsia at TSH should be transferred to SGH
- Assess the woman and her family's educational needs regarding hypertension in pregnancy, and give them the brochure to read

5.7.2 Observations and monitoring

5.7.2.1 Maternal Observations

Maternal observation	Frequency
Blood pressure	3 hourly between 0600-0000hrs (Stable women do not need to be woken for observations between 000 and 0600hrs).
Full maternal observations	6 hourly
Urinalysis	Daily in morning

- Calculate and record average BP for the previous 24hrs each evening
- Send spot urine for protein and creatinine ratio (PCR) if ≥ 1+ protein revealed on UA.
  - Once PCR ≥ 30, do not send repeated urine samples for PCR unless otherwise directed
  - 24 hour urine collection is NOT required to assess proteinuria unless requested by OMP
- Record fetal movement, fetal heart rate, uterine activity and vaginal loss on every shift

5.7.2.2 Fetal Observations

- Perform a CTG on admission (if ≥25 weeks), then daily unless more frequent monitoring is clinically indicated.
- Arrange an ultrasound scan for fetal growth/wellbeing (unless a normal growth/wellbeing ultrasound has been performed within the previous 2 weeks and there are no new clinical concerns about fetal welfare)

5.7.2.3 Pathology testing

- Collect a FBC, UEC, LFT, Urate on admission
- Repeat blood tests on Monday and Thursday, unless otherwise indicated, until birth
- Record blood results on woman's 'Hypertension in Pregnancy Data Collection Sheet'

5.7.3 Antenatal management of hypertension

- Manage hypertension as per '*Treatment of Hypertension'*

5.7.4 Indications for delivery

- Women with confirmed PE ≥ 37 weeks
- Inability to control BP with maximum antihypertensive therapy
- Progressive deterioration in liver and/or renal function or thrombocytopaenia
- Neurological signs and symptoms
- Concerns about fetal wellbeing
- Women < 32 weeks and/or EFBW <1800g may need to be transferred to a Level 6 hospital if their clinical condition allows

5.8 INTRAPARTUM MANAGEMENT

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5.8.1 New onset of hypertension in labour for the first time

- Intrapartum hypertension is diagnosed if SBP≥ 140 or DBP≥ 90 on at least 2 occasions at least 15 min apart.
- If newly diagnosed hypertension in the intra-partum period:
  - Arrange medical review
  - Collect blood for FBC, UEC, LFT and urate
  - Perform BP every 30 minutes intra-partum, more frequently when BP unstable
  - Manage as per '*Treatment of Hypertension'*
  - Manage post-natally under the RAP team (SGH)
- Do not perform a urinalysis or spot urine measurement in labour as the results are unreliable.
- See section 5.10 for postnatal management of these women

5.8.2 Maternal observations

- For unstable women, one-on-one midwifery care must be instituted. If the current workforce does not allow this to occur, this matter is to be escalated to the relevant Nurse Manager (in office hours or after hours).
- The anaesthetic team should be informed of high risk or unstable women
- Measure and document BP every 30 minutes or more frequently if clinically indicated when in labour, in addition to routine intrapartum observations.
- If SBP ≥140 and < 160, or DBP≥ 90 and < 110) during labour
  - Call an **Obstetric Clinical Review**
  - Manage per *Treatment of Mild-Moderate Hypertension*
- If Severe hypertension (SBP ≥ 160 and / or DBP ≥ 110) during labour
  - Call an **Obstetric Rapid Response**
  - Manage as per *Management of Severe Hypertension*.
- Record urine output. In severe pre-eclampsia, a urinary catheter should be inserted and urine measured hourly. Contact renal registrar if concerned about urine output (<30mL per hr over 3 hours) or renal function (creatinine ≥90umol/L)
- Cannulate with wide bore (16fg or 18fg) cannula

5.8.3 Fetal Observations

Continuous electronic fetal monitoring (CEFM) is required if:

- Preeclampsia
- New onset of hypertension during labour
- Gestational or essential hypertension

5.8.4 Pathology

- In women with preeclampsia, collect FBC, UEC, LFT and Urate
- For essential or gestational hypertension, collect the above tests as directed by medical officers.

5.8.5 Medications

- Administer prescribed antihypertensives prior to commencement of labour or induction
- Do not administer further oral antihypertensive medications once labour is established unless specifically instructed
- Do not use non-steroidal anti-inflammatory drugs

5.8.6 Fluid management

- If epidural is to be used, preloading should be with 0.9% normal saline (500mL) over 60 minutes. Inform anaesthetist of platelet count before insertion of epidural block
- Otherwise, total IVI fluids should be 60-80mL/hr (after preload as above)
- If oxytocin required, consider doubling the concentration and halving the rate (i.e. 20 units of oxytocin in 1 Litre of sodium chloride 0.9%, commenced and increased at half the protocol rate).
- Use hourly urine bag to measure output.

5.8.7 Third stage of labour

- Do not use ergometrine or Syntometrine (5 units oxytocin and 500 microg ergometrine maleate) as first line management in third stage because of hypertensive action
- Obstetrician and OMP to determine most suitable ward immediately postpartum (i.e. postnatal ward, ICU or Birth Unit)

5.9 MANAGEMENT OF WOMEN UNDERGOING CAESAREAN SECTION

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5.9.1 Pre-operatively:

- Inform anaesthetic team
- Use hourly urine bag when catheterised (usually in theatre)
- Ensure FBC has been attended that day to exclude thrombocytopaenia
- Severe hypertension should be managed prior to transfer (see below) if clinical condition allows
- Otherwise manage as per SGH WCH CLIN020 *Caesarean Section* or TSH WCH CLIN142 *Caesarean Section*

5.10 POSTPARTUM MANAGEMENT

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5.10.1 For women with new onset hypertension diagnosed in labour for the first time

Women who have new onset hypertension in labour, and if the diagnosis of pre- eclampsia / hypertension is unclear, should have:

- 24 hours of postpartum blood pressure monitoring
- a urinalysis +/- spot urine taken postnatally
- a review by the RAP team the following day regarding the diagnosis and ongoing care

5.10.2 For women with new onset hypertension diagnosed for the first time postnatally

If newly diagnosed hypertension in the postnatal period:

- Arrange medical review or escalate as per Between the Flags (BTF) criteria
- Perform a UA and send for PCR if ≥ +1 proteinuria
- Collect blood for FBC, UEC, LFT and urate
- Manage as per *'Treatment of Hypertension'*

5.10.3 Observations for all postnatal women with hypertension

Maternal observation	Frequency	Cease when:
Blood pressure	3 hours between 0600-000hrs	Cleared by the RAP team
Full maternal observations	6 hourly	Until discharge
Urinalysis	Daily	Cleared by the RAP team

- Record all observations on SMOC chart in eMR

5.10.4 For women with severe preeclampsia:

- Manage in Birth Unit or ICU (CCU at TSH) if on a hydralazine and/or magnesium sulfate infusion
- Monitor urine output. Arrange medical review if less than 30mL/hr:
    - If no signs of fluid overload, administer colloid fluid 200mL stat and assess response. Do NOT give more than 500mL
- If evidence of fluid overload (elevated JVP or basal lung crepitations), notify OMP for further management
- If urine output adequate, maintenance fluids can be Hartmann's or sodium chloride 0.9% 1000mL/8 hours until tolerating oral intake

5.10.5 Pathology

- Only recheck FBC, UEC, LFT and Urate if there were abnormalities in these prior to birth or woman's condition deteriorates postnatally.
- Otherwise no further blood tests are routinely needed after delivery
- Do not send repeat spot urine or urinalysis unless directed by OMP or RAP consultant

5.10.6 Medications

- Recommence oral antihypertensive therapy as soon as the woman able to tolerate
- Do not use non-steroidal anti-inflammatory drugs (NSAIDS)
- Administer thromboprophylaxis-
    - TED stockings for all women
    - enoxaparin if PE (unless contraindicated), and women with additional risk factors (refer to CBR
    - a review by the RAP team to decide on the diagnosis and the need for further monitoring and/or treatment

5.10.7 Follow-up

- All women should be followed up by their GP or OMP:
    - Within 1 week if BP still elevated or taking antihypertensives at discharge
    - After 3 months in all women to ensure BP & U/A are normal
    - Yearly for life to detect cardiovascular disease or hypertension
- The *Hypertension in Pregnancy Data Collection Sheet* should be completed by the midwife prior to discharge. This information is used by the OMP for:
    - Generating summary and follow-up letters to GPs and Obstetricians
    - The Hypertension in Pregnancy database is used to report quality outcomes

5.11 TREATMENT OF HYPERTENSION

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5.11.1 Principles

- Treatment should generally be instituted when hypertension is diagnosed
    - After a DAU visit, or
    - After 3 hours of observation in hospital or
    - An overnight stay as an inpatient
- Target BP is systolic BP 110-140 and diastolic BP 80-85
- Allow at least 24 hours for each dose increment or additional agent to take effect
- Increase dose or add a second agent no sooner than every 24 hours until target BP reached

5.11.1 Regimen

- Antihypertensive treatment is at the direction of the OMP, RAP consultant, or O&G consultant afterhours and at TSH
- Consider consulting the OMP when the addition of a second line agent is required

FIRST LINE AGENTS					
Agent	**Starting dose**	**Second step**		**Third step**	**Max dose**
Nifedipine slow release (SR)	30mg mane	30mg bd	Consider adding a second line agent	30mg mane/ 60mg nocte, then 60mg bd	120mg/day
OR					
Methyldopa	250mg tds	500mg tds	Consider adding a second line agent	750mg tds	2500mg/ day
OR					
Labetalol	100mg tds	200mg tds	Consider adding a second line agent		600mg tds

SECOND LINE AGENTS					
Agent	**Starting dose**	**Second step**		**Third step**	**Max dose**
Metoprolol	50mg bd	100mg bd	Add another agent		200mg/day
Hydralazine (oral)	12.5mg tds	25mg tds	Consider adding a second line agent	50mg tds	200mg/ day
Prazosin	0.5mg tds	1mg tds	Consider adding a second line agent	titrate slowly up to 5mg tds	20mg/day

5.12 TREATMENT OF SEVERE HYPERTENSION

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5.12.1 Definition

Severe Hypertension	SBP ≥ 160 and/or DBP ≥ 110

5.12.2 Principles

- Urgent management is required when severe hypertension is diagnosed
- Repeat the BP after 5 minutes:
    - If SBP<160 and DBP <110, recheck again in 30 minutes
- If severe hypertension persists follow treatment (section 5.12.3) immediately
- Initiate an **Obstetric Clinical Review**. Notify OMP and RAP consultant, or on call obstetrician after hours, (or private obstetrician for private patients).
- Collect FBC, EUC, LFT, Urate
- Obstetric RMO to discuss with obstetric registrar
- Give normal antihypertensive medications if due (as well as the below management)
- Commence continuous CTG monitoring (if not birthed) until BP stabilises

5.12.3 Oral management for non-labouring women

Call an **Obstetric Clinical Review**

Administer **200mg labetalol orally** (standing order)

Monitor and record BP every 15 minutes

Perform continuous CTG (if antenatal)

If after 60 minutes severe hypertension persists:

Call an **Obstetric Clinical Review**

Give second dose of **200mg labetalol orally**

Monitor BP every 15 minutes until BP stabilises

If after another 60 min, severe hypertension persists:

Call an **Obstetric Clinical Review**

Give third dose of **200mg labetalol orally**

Monitor BP every 15 minutes until BP stabilises

If after another 60 min, severe hypertension persists:

Call an **Obstetric Rapid Response**

Cannulate, collect FBC, UEC, LFT, urate, transfer to Birth Unit)

Commence IV management (as below)

5.12.4 Intravenous antihypertensive management

IV management is first line management for

- Labouring women, or
- Women who do not respond to oral management as outlined above, or
- Where oral therapy is not available or suitable

Call an **Obstetric Rapid Response**

Administer IV 0.9% sodium chloride 500mL over 4 hours

Dilute 20mg hydralazine in 20mL of water for injection

Administer **5mg (5mL) hydralazine** as an IV bolus

Monitor and record BP every 10 minutes

Perform continuous CTG monitoring (if not birthed)

If after 20 minutes severe hypertension persists:

Administer second dose of **5mg (5mL) hydralazine** as an IV bolus

If after another 20 minutes, severe hypertension persists:

Administer third dose of **5mg (5mL) hydralazine** as an IV bolus

5.12.5 Management of persisting severe hypertension

- If severe hypertension persists after 3 boluses of IV hydralazine:

Call an **Obstetric Rapid Response**

Registrar to notify RAP consultant and OMP

Draw 10mL out of a 500mL sodium chloride 0.9% bag, mix the 10mL with 80mg hydralazine powder and then load it back into bag to make 500mL bag

Commence **hydralazine infusion** via infusion pump
Commence infusion at **30mL/hr** i.e. 5mg/hr

Increase infusion by 10mL every 30 minutes to a maximum of 90mL/hr (ie. 15mg/hr), aiming for SBP 140 –160mmHg and DBP 90-100mmHg

- The hydralazine infusion should be weaned and overlapped with oral antihypertensives (unless low BP) under the direction of the OMP and/or RAP consultant (O&G consultant at TSH).

5.12.6 Maternal observations when stabilised on hydralazine infusion

Maternal observation	Frequency
Blood pressure	30 minutely
Pulse	Hourly
Urine output	Hourly
Temperature	4- hourly

- See also section 5.13 if also on magnesium infusion

5.12.7 Other Important points

- Consider eclampsia prophylaxis with magnesium Sulfate (Refer to *Eclampsia Prophylaxis and management*)
- Initiate an **Obstetric Rapid Response** call if there is deterioration in maternal or fetal condition e.g. hypotension (SBP ≤ 110mmHg and/or DBP ≤ 80mmHg), neurological symptoms, epigastric pain, fetal distress
- Severe hypertension may be an indication for delivery depending on gestation and individual circumstances. Women with severe hypertension should not be transferred to another hospital for delivery until clearly stable as it is not considered safe practice.
- In early onset cases delivery should be expedited at SGH, notify paediatric team, NETS in advance and, if necessary, the baby then transferred.
- In cases of in utero transfer, a hydralazine infusion may be safe to discontinue during the transfer after consultation between the obstetrician and OMP involved
- **For SGH:** Women with severe hypertension requiring intravenous hydralazine can be managed in the Birth Unit after birth at the discretion of the RAP consultant and OMP in consultation with the MUM/IC shift of Birth Unit. If woman unable to be managed in the Birth Unit, then transfer to ICU for further management.
- For women at TSH refer to SGH-TSH WCH CLIN083 *Criteria for Maternity Care at St George and Sutherland Hospitals*

5.13 ECLAMPSIA PROPHYLAXIS AND MANAGEMENT

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5.13.1 Principles

- The use of magnesium sulfate treatment must be discussed with the obstetrician and Obstetric Medicine Physician (OMP) on call
- The administration of magnesium sulfate antenatally is usually an indication for birth
- Caution is required if maintenance calcium channel blockers are being used concurrently (nifedipine for acute severe hypertension is safe). Discuss with OMP.

5.13.2 Indications for magnesium sulfate treatment

- After an eclamptic convulsion
- In the presence of:
    - altered mental state
    - clonus (≥3 beats)
    - repeated visual scotomata
    - Severe hypertension with proteinuria
- Consider if severe or rapidly progressive pre-eclampsia

5.13.3 Regimen

ECLAMPSIA PROPHYLAXIS AND MANAGEMENT

Loading dose:

use 4g (8mL) magnesium sulfate in 100mL 0.9% sodium chloride

Administer IVI at **300 mL/hr** via infusion device (i.e. over 20 minutes)

Maintenance dose:

Remove 20 mL solution from 100 mL 0.9% sodium chloride infusion bag and discard. Add 10g magnesium sulfate (4 ampoules = 20 mL) to the bag

Infuse at **10mL/hr** (1g/hr)

Maintain infusion for 24-36 hrs postnatally

- Magnesium sulfate must be administered via an infusion device and through a second cannula
- No other drugs or fluids must be administered via the magnesium sulfate IV line
- Magnesium sulfate infusion must be infused via infusion device at appropriate rate or ceased on transfer to theatre (or in-utero transfer to tertiary hospital), or discontinued and the tubing disconnected to prevent accidental overdose

5.13.4 Observations and care during magnesium sulfate infusion:

- Magnesium sulfate infusions should be managed in the Birth Unit with appropriate staffing ratio
- Continuous CTG monitoring if ≥ 26 weeks gestation (if < 26 weeks gestation, perform 30 minutely auscultation)

5.13.5 Maternal observations whilst on magnesium sulfate infusion

Maternal observation	Frequency	Cease infusion if:
Blood pressure	Hourly*	BP<110 systolic or 70 diastolic
Respiratory rate	Hourly	Respiratory rate< 10 breaths per minute
Pulse	Hourly	
Tendon reflexes	Hourly	Unable to elicit reflexes
Urine output	Hourly	<30mL/hr for 3 consecutive hours
Temperature	4- hourly	

- Tendon reflexes are usually knee reflexes but upper limbs can be used if epidural or spinal anaesthetic in place.
- Check magnesium level if there are any signs or symptoms of toxicity.
- Record all observations on SMOC

* if also on hydralazine infusion, see section 5.12.5

5.13.6 Cessation of infusion

Continue infusion at:

- 24-36 hours following delivery or post last seizure or
- As per OMP or consultant obstetrician's instructions

5.13.7 Management of magnesium sulfate toxicity

- Measurement of serum magnesium sulfate levels is not necessary unless signs of toxicity
- Magnesium level above 3.5 mmol/L is generally considered to increase the risks of toxicity.
- Signs of magnesium sulfate toxicity:
  - Respiratory rate <10/min or SaO_2 < 92%
  - Muscle Paralysis
  - Urine output <30mL/hr for 3 consecutive hours.
  - Reflexes absent
    - Systolic BP ≤110 mmHg and/or diastolic BP ≤ 80 mmHg
- If toxicity suspected:
  - Cease the infusion, take blood for magnesium sulfate level
  - Call an **Obstetric Rapid Response**
- Treatment of magnesium sulfate toxicity:

Administer **calcium gluconate 10%, 10mL in 100 mL 0.9% sodium chloride** IVI over 10-20 minutes

5.13.8 Management of Eclampsia

- Initiate an **Obstetric Code Blue**
- Manage fitting (eclampsia):
  - Place woman on her side, clear pharynx by suction', insert airway, give oxygen

Administer **magnesium sulfate IV 4g in 100mL 0.9% sodium chloride** as a bolus over 10-20 minutes and repeat if fitting has not ceased

  - Call RAP consultant and OMP (O&G Consultant after-hours and at TSH)
  - Commence maintenance dose magnesium sulfate infusion (as above) to prevent further fitting
- Manage hypertension if present
- Collect FBC, UEC, LFT, Urate and coagulation studies
- Prepare for delivery of the baby where appropriate
- Magnesium sulfate infusion should be continued for 24-36 hours post-natally
- Women should be managed in ICU/Birth unit until stable and magnesium sulfate infusion complete.

6. Cross References	NSW Health PD2013_043 *Medication Handling in NSW Public Health Facilities* NSW Health PD2017_013 *Infection Prevention and Control Policy* NSW Health PD 2010_022 *Maternity - National Midwifery Guidelines for Consultation and Referral* NSW Health GL2018_025 *Fetal Heart Rate Monitoring* Australian College of Midwives *National Midwifery Guidelines for Consultation and Referral 4th Edition* SGH-TSH WCH CLIN116 *Thromboembolism - Prophylaxis and Treatment in Maternity* SGH WCH WPI 297 *Transfer of clinically suitable postnatal women to the birth unit* SGH WCH CLIN027 *Risk associated Pregnancy (RAP) Team - Criteria for Allocation SGH* SGH-TSH WCH CLIN031 *Obstetric Cholestasis* SGH WCH CLIN020 *Caesarean Section* TSH WCH CLIN142 *Caesarean Section* SGH-TSH WCH CLIN083 *Criteria for Maternity Care at St George and Sutherland Hospitals*
7. Keywords	Hypertension, pregnancy, labour
8. Document Location	Maternity - Hypertension
9. External References	1. Guidelines for the Management of Hypertensive Disorders of Pregnancy. SOMANZ 2014 (Updated June 2015) 2. 2008. Brown M, Lindheimer M, de Sweit M, Van Assche A, & Moutquin

	JM. The classification and diagnosis of the hypertensive disorders or pregnancy: Statement from the International Society for the Study of Hypertension in Pregnancy (ISSHP). 2001 Hypertension in Pregnancy, vol 20, no.1, pp IX-XIV. 3. Hypertension in pregnancy: diagnosis and management. Clinical guideline [CG107]. National Institute of Clinical Excellence (UK). August 2010, updated January 2011 4. Australian College of Midwives: National Midwifery Guidelines for Consultation and Referral. May 2013 5. Davis, G; Robert, L; Mangos, G & Brown, M 2013 Comparisons of auscultatory hybrid and automated sphygmomanometers with mercury sphygmomanometry in ypertensive and normotensive pregnant women: parallel validation studies. Journal of Hypertension 33: 499-506 DOI:10.1097/HJH.0000000000000420 6. Lu, J.F., Nightingale, C.H. Magnesium Sulfate in Eclampsia and Pre-Eclampsia. Clin Pharmacokinet 38, 305–314 (2000)
10. Consumer Advisory Group (CAG) approval	*Hypertension in Pregnancy* Patient Brochure
11. Implementation and Evaluation Plan	**Implementation:** The document will be published on the SGH-TSH business rule webpage and distributed via the monthly SGH-TSH CGD report. The revised CIBR will be distributed to all medical, nursing and midwifery staff via @health email. The CIBR will be discussed at ward meetings, education and patient quality and safety meetings. Education will occur through in-services, open forum and local ward implementation strategies to address changes to practice. The CIBR will be uploaded to the W&CH CIBR page on the intranet and staff are informed how to access the page **Evaluation:** The staff are asked to sign an audit sheet in their clinical area to acknowledge they have read and understood the revised CIBR.
12. Knowledge Evaluation	**Q1: Which pregnant women considered to be at high risk of preeclampsia should receive aspirin?** A1: Previous history of preeclampsia; pre-existing diabetes (Type 1 or T2; Antiphospholipid syndrome; chronic hypertension; chronic kidney disease **Q2: What is the drug used to treat non labouring women with severe Hypertension** A2: Administer **200mg labetalol orally** (standing order) use section 5.12.3 for treatment plan **Q3: Indications for magnesium sulfate treatment?** A3: After an eclamptic convulsion or in the presence of: ○ altered mental state ○ hyperreflexia with clonus (≥3 beats) ○ repeated visual scotomata ○ Severe hypertension with proteinuria Consider if severe or rapidly progressive pre-eclampsia (PE)
13. Who is Responsible	Senior Obstetric Medical Officers Senior Maternity Unit Managers

Approval for: HYPERTENSION IN PREGNANCY	
Specialty/Department Committee	Committee: Women's & Children's Health Clinical Governance Documents Sub-Committee Chairperson: Louise Everitt, CMC SGH Chairperson: Trent Miller, O&G Staff Specialist SGH Date: August 2021
Nurse Manager (SGH)	Lorena Matthews Midwifery & Nursing W&CH Date: 10.09.2021
Nurse Manager (TSH)	Rebecca Moore, Midwifery & Nursing Manager W&CH Date: 10.09.2021
Medical Head of Department (SGH)	Prof Michael Chapman, Medical Director W&CH Date: 07.09.2021
Medical Head of Department (TSH)	Dr Andrew Zuschmann, Medical Director W&CH Date: 10.09.2021
Medical Head of Department (Renal)	Prof Mark Brown, HoD Renal Medicine Date: 08.09.2021
Safe Use of Medicines Committee (SGH)	Chairperson: A/Prof Winston Liauw Date: 01.11.2021
Safe Use of Medicines Committee (TSH)	Chairperson: Dr Van Nguyen Date: 29.10.2021
Executive Sponsor	Prof Michael Chapman, Medical Director W&CH Date: 07.09.2021
Contributors to ClBR	**Contribution**: RAP O&G Consultants Obstetric Medicine Physicians W&CH CGD subcommittee Prof Mark Brown
	Consultation:

Revision and Approval History				
Revision Date	Revision number	Reason	Coordinator/Author (Position)	Revision Due
Nov 2014	1	Multiple hypertension / eclampsia business rules combined. See previous versions revision history for details	Louise Everitt (CMC)	Nov 2017
May 2017	2		Louise Everitt (CMC) Dr Trent Miller	May 2019
Sep 2019	3		Louise Everitt (CMC) Dr Trent Miller O&G Staff Specialist	Sep 2020
Feb 2020	4	Interim	Louise Everitt (CMC) Dr Trent Miller O&G Staff Specialist	May 2020
Mar 2020	5	Updated meds	Louise Everitt (CMC) Dr Trent Miller O&G Staff Specialist	Mar 2023
Oct 2021	6	Review: Medication (labetalol) changes, Referral to RAP process	Dr Trent Miller O&G Staff Specialist	Oct 2023

General Manager's Ratification
Name: Paul Darcy (SGH) Date: 02.11.2021
Name: Vicki Weeden (TSH) Date: 28.10.2021

Instructions for Home Blood Pressure Measurement in Pregnancy

Surname_____ First Name _____

MRN _____ DOB _____

1. Measure blood pressure 3 times in the morning (before medications) and 3 times in the evening. Ensure you are rested and allow 1 minute between readings.
2. Ignore the 1st reading each time and average the next 2 readings.
3. Record the average measurements in the table below
4. Do this for any 3 days in the week
5. Average out the morning BPs and the evening BPs at the end of the week.

Acceptable BP AT HOME (AVERAGE) in Pregnancy is <135/85mmHg

Date		***Morning (2 readings, 2 min apart)***		***Evening (2 readings, 2 min apart)***	
	Day 1				
	Day 2				
	Day 3				
	Average of the 3 days				
	Day 1				
	Day 2				
	Day 3				
	Average of the 3 days				
	Day 1				
	Day 2				
	Day 3				
	Average of the 3 days				

Please call the Birth Unit on 9113 2125 if you have a reading over 160 (top number) or 110 (bottom number).

Low dose aspirin in pregnancy

For some women, we recommend that they take a low dose of aspirin daily during pregnancy.

Taking low dose aspirin may reduce the risk of having a medical problem called pre-eclampsia, or a baby who is not growing well.

Pre-eclampsia is a problem where women develop high blood pressure later in pregnancy and it can make you and your baby unwell.

Women who have a higher risk of developing pre-eclampsia may be advised to take low dose aspirin from early in the pregnancy until about the last month.

This may include women who had pre-eclampsia with a previous baby, who have high blood pressure or kidney problems when not pregnant, or who are screened as having a higher risk of pre-eclampsia on early pregnancy testing.

Low dose aspirin thins the blood a little and reduces inflammation which may help the placenta (afterbirth) to develop better. A placenta that doesn't develop properly is thought to be one of the reasons why some women develop pre-eclampsia or a baby who doesn't grow well.

Low dose aspirin is safe to take and has been well researched. The currently recommended dose is 150mg taken every night. This is half a standard 300mg aspirin tablet which can be swallowed or dissolved into water. If you are feeling nauseated you should take it with food.

Please do not worry if the packet of aspirin says not to take in pregnancy.

Taking low dose aspirin causes almost no side effects and is well tolerated.

Please remember to take it every night.

St George and Sutherland Hospitals Women's and Children's Health Services Protocols Committee

Sept 20