BACKGROUND/RATIONALE

Hypertension is the most common medical problem encountered in pregnancy. It is a leading cause of perinatal and maternal morbidity and mortality and pregnant women with hypertension are more likely to develop placental abruption, disseminated intravascular coagulation (DIC), cerebral haemorrhage, hepatic failure and acute renal failure.

DESIRED OUTCOME/OBJECTIVE

- Prompt and early recognition and management of pre-eclampsia to reduce maternal and perinatal morbidity and mortality

DEFINITIONS

Hypertension (HT) in pregnancy: Blood pressure taken in the sitting position (with the right arm horizontal) that is persistently recorded as being more than 30 mmHg systolic and/or more than 15 mmHg diastolic above pre-pregnancy or early pregnancy values or, in the absence of knowledge of pre-pregnancy or early pregnancy values, ≥140mmHg systolic and/or ≥90mmHg diastolic

Severe hypertension in pregnancy: A blood pressure of ≥160mmHg systolic or ≥110mmHg diastolic (requires urgent assessment and management)

Pre-eclampsia (PE): is a multisystem disorder arising after 20 weeks gestation. The usual manifestation is hypertension and proteinuria, although proteinuria is not mandatory in order to confirm the diagnosis.

- Classification
  - Mild to moderate: Defined as systolic blood pressure of 140mmHg and/or diastolic blood pressure of 90 mmHg or higher measured on at least two occasions over several hours, combined with proteinuria >300 mg total protein in a 24 hour urine collection, or ratio of protein to creatinine >30 mg/mmol
  - Severe pre-eclampsia: Defined as a systolic blood pressure of 160mmHg and/or diastolic blood pressure of 110mmHg or higher measured on at least two occasions over several hours, combined with proteinuria >300mg total protein in a 24 hour urine collection, or ratio of protein to creatinine >30mg mmol and usually accompanied by other haematological, neurological, hepatic or renal derangement. The diagnosis may also be considered with lesser degrees of hypertension in women who have clinical features and/or haematological derangement.
**Eclampsia**: is defined as one or more seizures in association with pre-eclampsia. Seizures may occur antepartum (greater than 20 weeks gestation), intrapartum or in the postpartum period. Eclampsia presents as a tonic clonic seizure(s), with jerking limb and head movements. Most seizures are self-limiting and usually resolve within 90 seconds. The experience can be distressing for the woman, her support person(s) and the staff involved.

**Pre-eclampsia superimposed on chronic hypertension**: is diagnosed where a women with pre-existing hypertension develops systemic features of pre-eclampsia after 20 weeks gestation

**INDICATIONS**

Diagnosis is made only after clinical examination and laboratory testing using pregnancy specific ranges. Management is then based on findings and gestational age.

Clinical Features of pre-eclampsia include:

- **Renal**
  - Protienuria ≥ 1+ on dipstick
  - Protienuria confirmed by laboratory testing of a spot urine protein/creatinine ratio of ≥ 30mg/mmol or 24 hour urine collection ≥ 300mg
  - Serum uric acid elevated (interpreted according to gestation)
  - Oliguria (<500mL/24 hours or <20 mL/hour
  - Serum or plasma creatinine > 90micromol/L
  - Rapid weight gain with or without generalised oedema

- **Haematological**
  - Thrombocytopenia (platelet count < 100x10⁹/L)
  - Coagulation profile derangement
  - HELLP syndrome (haemolysis, elevated liver enzymes and low platelet count)
  - Disseminated intravascular coagulation (DIC)

- **Hepatic**
  - Nausea and/or vomiting
  - Upper abdominal pain (often in the right upper quadrant)
  - Severe epigastric pain
  - Raised serum transaminase >70U/L

- **Neurological**
  - Severe headache
  - Persistent visual disturbances (photophobia, scotomata, cortical blindness, retinal vasospasm)
  - Hyper-reflexia with sustained clonus (>2beats)
  - Convulsions (eclampsia)(Refer to CPG/E005 Hypertension in Pregnancy – Eclampsia)
  - Stroke

- **Pulmonary oedema**

- **Intrauterine growth restriction (IUGR)**

- **Placental abruption**

**ISSUES TO CONSIDER**
Antenatal assessment at booking should include assessment of the following risk factors for pre-eclampsia and appropriate referrals and care planning should be made.

- **High Risk Factors (close surveillance recommended)**
  - Pre-eclampsia in a previous pregnancy
  - Multiple pregnancy
  - Pre-existing medical conditions
    - Chronic hypertension
    - Diabetes (pre-existing or gestational)
    - Thrombophilias
      - Antiphospholipid antibody syndrome
      - Protein C and S deficiency
      - Antithrombin III deficiency
      - Factor V Leiden
    - Renal disease

- **Additional Risk Factors (additional antenatal surveillance recommended)**
  - Body mass index (BMI >35 kg/m²)
  - Raised blood pressure at booking
  - Vascular and connective tissue disorders
  - Maternal age <18 or >35
  - Null parity
  - Family history of pre-eclampsia
  - New partner
  - Poor outcome in a prior pregnancy (placental abruption, IUGR, fetal death in utero)
  - Inter-delivery level of >10 years
  - Gestational trophoblastic disease
  - Fetal triploidy

- **Preventative supplements for women with high risk factors for Pre-eclampsia include:**
  - Low dose aspirin (75-100mg/day) from before 16 weeks to at least 37 weeks gestation
  - Oral calcium supplementation (1g/day) if dietary intake low (<600mg/day or <two dairy servings a day)

**Ongoing care must take into consideration:**

- **Potential fetal consequences of hypertension and pre-eclampsia due to placental insufficiency include:**
  - Reduced fetal movements
  - Abnormal fetal heart rate on cardiotocograph (CTG)
  - Reduced amniotic fluid index (AFI)
  - Asymmetrical growth restriction
  - Increased resistance, absent or reversed end diastolic flow on umbilical artery doppler
  - Low biophysical profile score

- **Place of care after initial assessment and observation consider:**
  - A woman with **mild pre-eclampsia** may not require admission taking into consideration disease progression, client compliance and geographical proximity to the hospital.
  - The Pregnancy Assessment Service (PAS) can be used for additional outpatient monitoring outside of normal antenatal clinical attendance
  - Women with **moderate to severe pre-eclampsia** must be cared for as a hospital inpatient and their care must be discussed with a senior clinician
Consider transfer to a tertiary hospital if ≤ 32 weeks completed gestation depending on the severity and progression of the disease. Contact the Perinatal Emergency Referral Service (PERS)

- **Outpatient Maternal and Fetal Surveillance**
  - Maternal Frequency – daily to weekly
    - Review for new symptoms or signs
    - Blood pressure
    - Urinalysis for protein
    - Pre-eclampsia blood screen (FBE, U&E, LFT, clotting studies, serum uric acid)
    - 24 hour urine collection and/or spot urine for protein creatinine ratio
  - Fetal Frequency – daily to second weekly
    - CTG
    - Fetal umbilical artery Doppler
    - AFI
    - Growth (2nd weekly)

- **Inpatient Maternal and Fetal Surveillance**
  - Maternal
    - Blood pressure monitoring 4 hourly
    - Daily urinalysis for protein
    - Daily pre-eclampsia blood screen (FBE, U&E, LFT, clotting studies, serum uric acid)
    - Daily 24 hour urine collection and spot urine for protein creatinine ratio
    - Maintain accurate fluid balance chart
    - Consider deep vein thrombosis (DVT) prophylaxis
    - Daily review by obstetric team (minimum)
  - Fetal
    - CTG daily
    - Fetal umbilical artery Doppler, AFI and growth as indicated by senior clinician

- **Control of hypertension**
  - The initiation and use of antihypertensive therapy must be done in consultation with a senior clinician.
  - Initiation of oral anti-hypertensive therapy in mild pre-eclampsia may be indicated if the blood pressure begins to exceed 140/90 mmHg and/or other contributing factors such as diabetes, chronic hypertension, renal or vascular disease are present
  - Oral antihypertensive therapy is indicated when blood pressure exceeds 150/100mmHg.
  - The drug of choice is dependant on the preference of the senior clinician. As a guide see the following table:

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose</th>
<th>Maximum dose in 24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyldopa</td>
<td>250mg-500mg bd-qid</td>
<td>3-4g</td>
</tr>
<tr>
<td>Labetalol (avoid in women with asthma)</td>
<td>100-400mg bd-qid</td>
<td>1600mg</td>
</tr>
</tbody>
</table>
- **Urgent control of severe hypertension**
  - A senior obstetric clinician must be present and coordinating care
  - The anaesthetic team must be notified and included in management planning
  - Intravenous Labetalol is the first drug of choice *(see DG/L003 LABETALOL Intravenous – severe hypertension in pregnancy)*
  - Intravenous Hydralazine may be indicated in women with asthma or congestive cardiac failure *(see DG/H002 HYDRALAZINE Intravenous – severe hypertension in pregnancy)*
  - The optimum blood pressure range to achieve and maintain is 140-160/90mmHg. Blood pressure should be continuously monitored and reduced gradually to avoid adverse fetal side effects from rapid decrease in uteroplacental perfusion
  - Frequency of blood pressure monitoring should be a minimum of 15-30 minutely until stable and then 4 hourly
  - Continuous oxygen saturation monitoring is recommended whilst stabilizing blood pressure
  - Continuous CTG monitoring must be performed during management of severe hypertension

- **Prophylaxis of Eclampsia**
  - Magnesium sulphate infusion is the drug of choice for eclampsia and is recommended for women with severe pre-eclampsia as seizure prophylaxis
  - Refer to CPG/E005 Hypertension in Pregnancy – Eclampsia and DG/M003 MAGNESIUM SULPHATE - Obstetric
  - Magnesium sulphate infusion should be continued for at least 24 hours following birth or the last seizure, whichever is later

- **Administration of corticosteroids**
  - Recommended if <34 weeks gestation (11.4mg Betamethasone IM daily for 2 doses) and if time to birth allows
  - A senior clinician may consider using in women 34-36 weeks gestation

- **Indications to expedite birth**
  - Severe pre-eclampsia regardless of gestation
  - Non-reassuring fetal status
  - Severe fetal growth restriction
  - ≥37 weeks gestation
  - Eclampsia
  - Placental abruption
  - Acute pulmonary oedema
  - Uncontrollable hypertension
  - Deteriorating platelet count
  - Deteriorating liver and/or renal function
  - Persistent neurological symptoms
  - Persistent epigastric pain

- **Mode and location of birth**
  - >34 weeks gestation, vaginal birth is optimal
  - Consideration must be given to fetal presentation, maternal and fetal wellbeing and favourability of the cervix
  - <32 weeks gestation a caesarean section may be necessary
  - Consult PERS if women has moderate to severe pre-eclampsia and is ≤32 weeks completed gestation and **not in labour** for transfer to tertiary obstetric setting
  - Consult NETS if **woman is in labour** and ≤32 weeks completed gestation for transfer of infant to a tertiary neonatal setting
Consult the Paediatric Team if considering induction of labour if the woman is ≤ 37 weeks completed gestation and/or there is evidence of fetal compromise in a neonate of any gestation

**Management of third stage of labour**
- Active management of third stage is recommended using 10 units of IM Syntocinon
- Ergometrine or Syntometrine may potentially contribute to hypertension and should be avoided however in the event of a postpartum haemorrhage requiring maternal resuscitation Ergometrine will be required as part of the management protocol with resuscitation being the priority.

**Fluid Management**
- The woman is at risk of pulmonary oedema from excessive fluid administration
- Fluid administration must be supervised by a senior clinician and carefully documented
- Strict fluid balance charting must be performed hourly (input and output) in cases of moderate to severe pre-eclampsia
- In severe pre-eclampsia and eclampsia an indwelling urinary catheter with an hourly urometer is indicated
- Restrict total fluid intake to 80 mL/hr in severe pre-eclampsia
- Observe closely for oliguria (<30mL/hour for 2 or more hours) and report to senior clinician
- Observe for pulmonary oedema
- Strict fluid balance monitoring must occur until the woman’s clinical condition is stable
- If no other complications are present post-birth crystalloids should be restricted to 1500mL in the first 24 hours

**Epidural analgesia**
- Appropriate in the absence of a coagulopathy
- Preloading of fluids is not advised
- Pre-referral to an anaesthetist is recommended
- Remifentanyl infusion (IV) may be an alternative if coagulopathy present

**HELLP Syndrome**
- A variant of severe pre-eclampsia (Haemolysis, Elevated Liver enzymes and Low Platelet count) and elements include thrombocytopenia (common), haemolysis (rare) and elevated liver enzymes (common)
- In a woman with pre-eclampsia the presence of any of the following is an indicator of severe disease:
  - Maternal platelet count of less than 100,000 x 10⁹/L
  - Elevated transaminases
  - Microangiopathic haemolytic anaemia with fragments/schistocytes on blood film
- Women with HELLP syndrome will require HDU/ICU admission post delivery. Prior to delivery it is more appropriate for the woman to be cared for in labour ward when fetal monitoring can occur.

**Postpartum Care**
- Monitoring (4 hourly or more frequently) should continue until:
  - BP is stable
  - Urine output has normalised
  - Blood investigations are stable or improving
- The blood pressure may remain unstable for 3-6 days postpartum and blood pressure monitoring should continue 4-6 hourly when stable whilst the woman is an inpatient as 44% of all cases of eclampsia occur in the postpartum period
→ Antihypertensive therapy should be titrated down aiming to keep the blood pressure <160/110 mmHg
→ Thromboprophylaxis should be considered unless contraindicated
→ Non-steroidal anti-inflammatory drugs (NSAIDS) are not generally recommended as they may contribute to hypertension and renal impairment particularly in the volume depleted woman
→ A prolonged hospital stay may be indicated in cases of severe pre-eclampsia and eclampsia
→ Women who have had pre-eclampsia and eclampsia must have early referral to their GP for timely follow-up. The senior clinician must indicate when this should occur. A well documented management plan must also be completed on the discharge summary which is faxed to the GP on discharge
→ Specialist referral is required if persistent hypertension and/or proteinuria
→ Appropriate postnatal counselling regarding the pregnancy and birth experience should be provided
→ Preconception counselling is recommended for subsequent pregnancies

RELATED DOCUMENTS

Internal
- CPG/H015 Hypertension in Pregnancy - Hypertensive Disorders
- CPG/P005 Hypertension in Pregnancy - Pre-eclampsia (PE)
- DG/H002 HYDRAZINE Intravenous – severe hypertension in pregnancy
- DG/L003 LABETALOL Intravenous – severe hypertension in pregnancy
- DG/M003 MAGNESIUM SULPHATE - Obstetric

External
- Pamphlet - The Royal Women’s Hospital “Explaining Pre-eclampsia – An information brochure for all pregnant women”

REFERENCES


